August 1985 No. 41

95p

Mark McGinn

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GAZINE



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OUR GUIDE TO COMPUTER CARE AND CURE

PROGRAMMING FOR PROFIT

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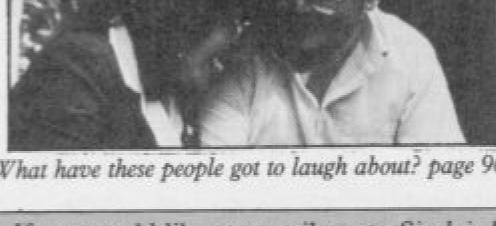
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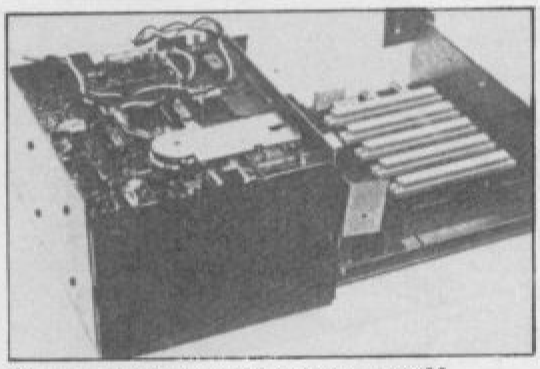


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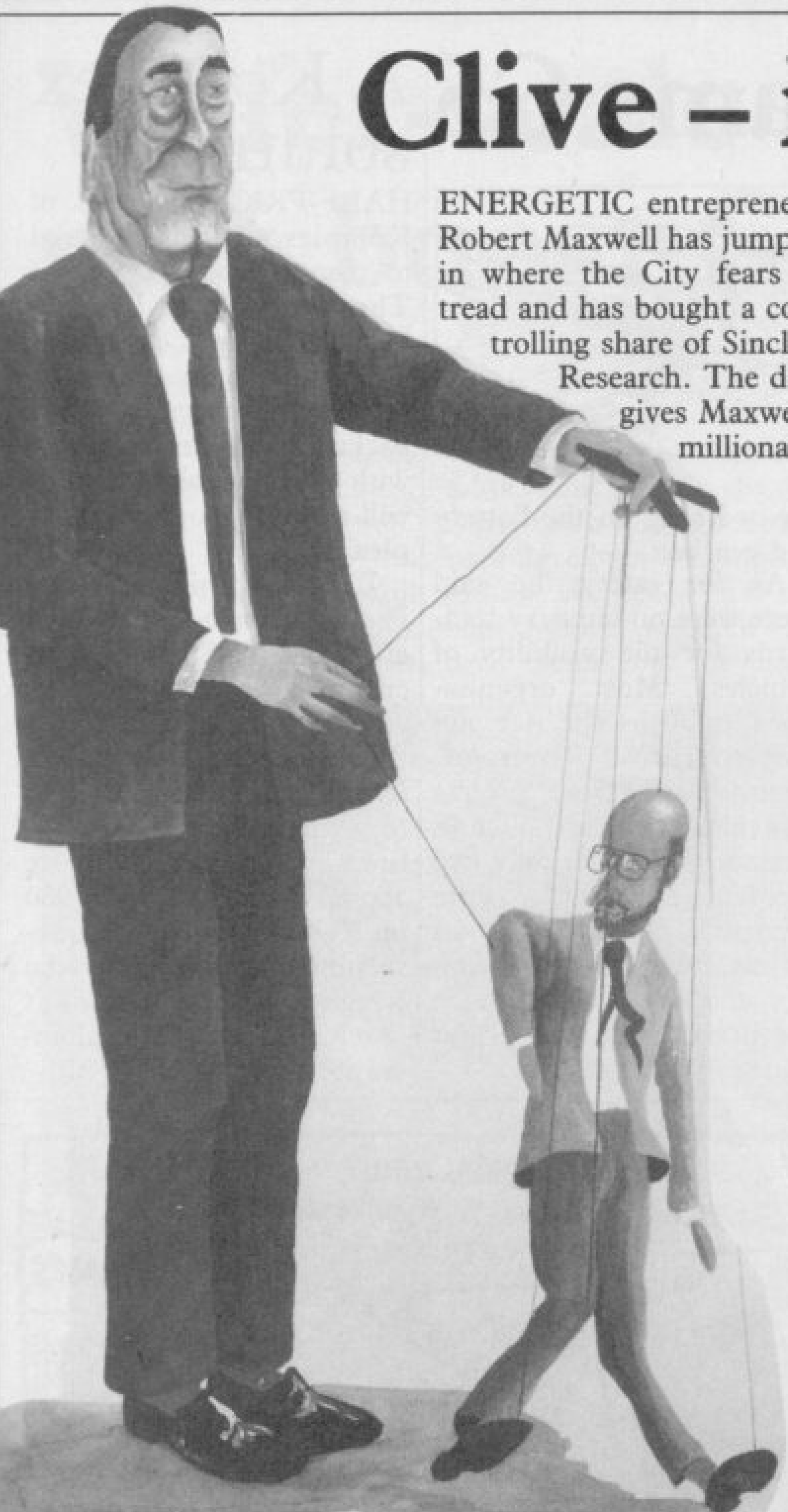
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If you would like to contribute to *Sinclair User* please send programs or articles to:
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Original programs should be on cassette and articles should be typed. We cannot undertake to return them unless a stamped-addressed envelope is included.
We pay £20 for each program printed and £50 for star programs.

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ABC 91,901 Jun-Dec 1984

Clive – in good hands?


Illustration: Michael Smith

ENERGETIC entrepreneur Robert Maxwell has jumped in where the City fears to tread and has bought a controlling share of Sinclair Research. The deal gives Maxwell, millionaire owner of the *Daily Mirror*, 75 per cent of the shares in return for £12m cash. That money is required to pay off Timex, Thorn EMI and Sinclair's bankers.

Sir Clive himself retains about eight per cent of the company, and the title of life president, but he no longer has a seat on the board. Instead, he has a five year contract as technical consultant, to head research and development at the company. The C5 company, Sinclair Vehicles, is not involved in the deal.

Sinclair Research has been drifting towards the rocks for months, following gross over-production at Christmas. That left the company with over £30m of stocks, many of which are thought to be QLs.

Robert Maxwell appears to have bought himself a bargain; only a year ago Sinclair Research was valued at £100m. His first task will be to find a new chief executive, to replace Sir Clive.

As for Sir Clive, he claims to be happy about the situation. He says his new position as life president is 'grandiose but meaningless' and stresses that all planned new products will continue to be developed 'as before'. It is difficult to believe that he feels no distress at all at losing control of his company, but he has always claimed to have no interest in financial matters or indeed personal wealth, and as such may welcome the opportunity to spend more time in the laboratory.

"We welcome Maxwell with open arms," says Joe Woods, marketing manager for Terry Blood, the sole UK distributor of Sinclair hardware. "It's the best thing that could have happened to the industry and to Sinclair. The company needed to be managed in a much more professional way and you can't get much more professional than Robert Maxwell."

Woods confirms that the current distribution deal, which runs into 1986, still stands, and that Terry Blood continues to be 'fully involved with Sinclair Research.'

Maxwell may not find life on the high-tech seas all plain sailing, however. Acorn, which was bailed out by Olivetti five months ago for a similar sum, has once again asked that its shares be suspended, this time at 11 pence. The £12m pumped in has apparently gone.

The success of Sinclair Research, therefore, must depend on new products, if current sales are falling. Its earlier glories came about through taking tremendous risks where conventional business thought scorned the whole concept of mass home computing.

Whether Maxwell is prepared to back such risks with hard cash in future developments is a question which will continue to exercise the industry for many, many months to come.

more news on page 6

Who is Robert Maxwell?

ROBERT MAXWELL, the new owner of Sinclair Research, is one of the most colourful figures in the British business world. Born in Czechoslovakia in 1923, he was captured by the Nazis during the invasion of France in 1940. He escaped, and fled to Britain, where he joined the army and later took part in the liberation of Europe in 1944.

He has no formal education, and his main company, Pergamon Press, was founded in 1951. From seven publications, Pergamon is now a large company with over 6000 books.

Apart from Sinclair Research and Pergamon, he also owns BPCC, a major printing works, and recently bought the Mirror Group of newspapers as well as Oxford United Football Club.

Politically, Maxwell identifies himself with the Labour party, and was MP for Buckingham for six years. He is still a member of the party, although a controversial one.

Maxwell regards his acquisition of both Sinclair and the Mirror Group as patriotic enterprises, as well as sound business investments. In the football arena he had to settle for Oxford United, having failed to buy Manchester United.

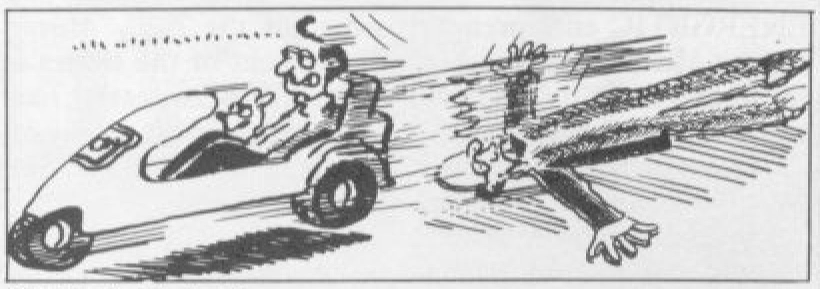
He is also celebrated, or notorious, for the intense personal interest he takes in his companies. Fleet Street is full of tales, many no doubt embroidered, of the results of unex-



pected visits by a mackintoshed Maxwell to the *Mirror* offices. Although he does not hold the position of chief executive of Sinclair Research, as he does at the *Mirror*, there is no reason to doubt that Maxwell will stamp his personality on the company as forcefully as on other business ventures.

Which? report slams C5

A KIT to link two C5 batteries together is to be released by Sinclair Vehicles in response to criticism of the variable range of the machine. According to spokesman Bill Nichols, the kit will cost in the region of £35.00, inclusive of the second battery.



C5 at twice the speed?

A recent report by consumer organisation *Which?* criticised the C5 on range, speed and reliability. It suggested that those limitations did not compare favourably with a bicycle, given the price of the C5 — £441.85 with the kit of extras.

On safety, the report said it was difficult to see in traffic and the driver was vulnerable at bumper height. It did however praise the C5 as 'fun and free of fuss' in the current driving conditions.

Nichols says the speed is fixed by the law to allow drivers without insurance to use the vehicle. "If we had produced a faster vehicle," he says, "we would have produced other refinements as well. We claimed a range of up to 20 miles, not always that. Tests show the range to vary widely depending on traffic conditions, gradients, and road surface." He says the new battery kit should counter criticisms of range, and that Sinclair Vehicles was working on the battery and gearbox.

As for safety, he said there were no industry standards for the visibility of vehicles. Most organisations, such as the AA and Department of Transport, regarded the C5 as "no less safe than a bicycle". Nichols stresses that so far only two accidents with C5s have occurred, neither, he claims, involving other vehicles and both "induced by the driver, with no serious injury as a result."

A Komplex solution

HALF-PRICED copies of **Komplex** are being offered to disenchanted owners of **The Great Space Race** by Software house Legend.

If purchasers send back the poster enclosed in the package to Legend, together with a cheque for £4.95 they will receive a copy of **Komplex** in return.

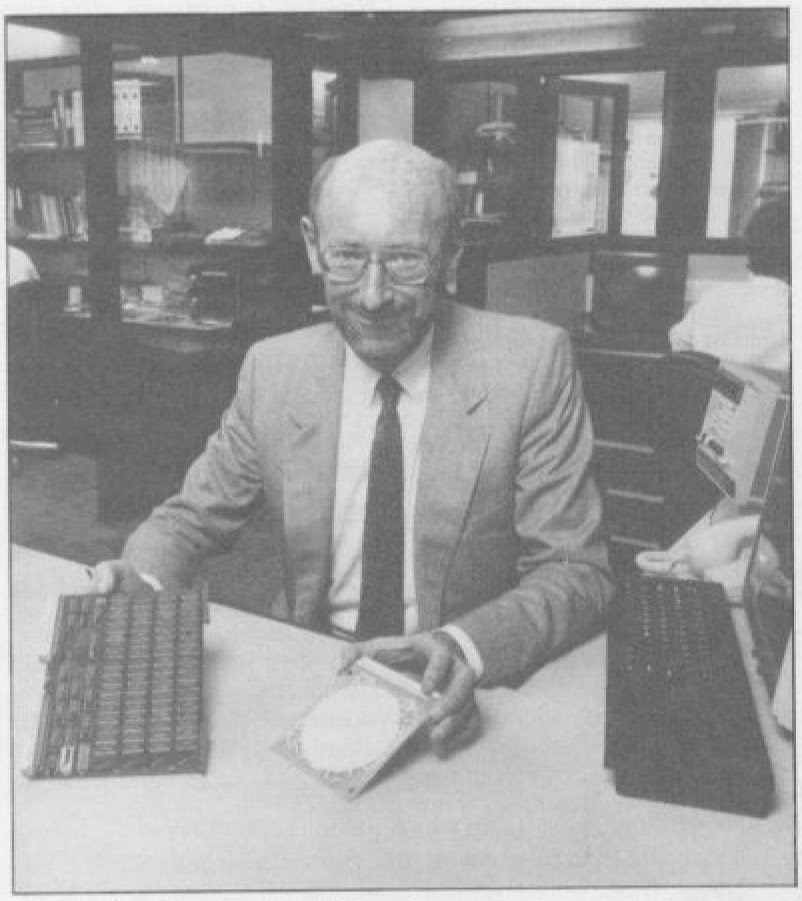
Legend chairman John Peel is worried about the effect that TGSR has had on customer support for the company. "We're making the offer because we feel that TGSR failed to live up to many people's expectations. The fact that we actually lost over £200,000 on TGSR is not much consolation to people who bought the game and didn't like it. We take our customers seriously.



Wafer-scale venture may boost Sinclair

THE WAFER-SCALE chip, which uses a four-inch disc of silicon to hold the equivalent power of hundreds of conventional chips, is almost set for production. Sir Clive Sinclair has announced the successful development of a technique for producing such chips at a cost and reliability rate which makes them viable for mass-production.

Metalab, the high-tech think tank set up by Sir Clive over a year ago for just such developments, appears to have succeeded first in a field where research has been going on for many years. A spokesman for Sinclair Research says the first wafer-scale product, a solid-state disc drive for the QL, is still on schedule for production later this year.



Sir Clive's wafer — on the right

Meanwhile, plans for a £50m plant to exploit the new technology have been shelved by new owner Robert Maxwell. Instead, the company is looking for partners to help develop the new chip. Under the takeover deal, Sinclair Research retains the patent on the wafer-scale chip, but Sir Clive is to be allowed to continue private research on fifth generation computers, at his own expense.

In the event of Sir Clive's personal fortune being sufficient to sustain the necessary research, in an area where companies and governments are spending billions of dollars, Sinclair Research will have a first option on new products with Sir Clive retaining the patents.

Regardless of that, however, the new chip, if it lives up to the claims made, is a genuine technological breakthrough.

The Spanish connection

A MAJOR international piracy operation, involving software from Britain's biggest software houses, has been uncovered.

Inforpress, a Spanish publishing company, produces a cassette magazine which provides its customers with 10 programs a month. Those pieces of software have included **Jet Set Willy** from Software Projects, **Danger Mouse in Double Trouble** from Creative Sparks and **Scuba Dive** from Durrell Software. Other companies which have had software pirated by Inforpress are Gargoyle Games, Vortex, Mikro-Gen, Softek and Artic.

Mike Meek of Mikro-Gen says: "We are sickened that the industry is being ripped off in this way. Recently I have been writing to magazines telling the people about our experiences of piracy and trying to get the trade to take note."

Some software houses are not so keen to pursue the issue as they believe nothing can be done about international piracy. A spokesman for Durell Software says: "We have been ripped off in Spain so many times that we've lost count."

Kempston takes DOS for drive

MANUFACTURE of the SPDOS disc interface, and all other Spectrum Products, has been stopped by Watford Electronics. SPDOS is now produced by Kempston which has changed the name to KDOS.

Kempston has reconfigured the package and included a centronics and joystick port with the 8K ROM-based operating system. Also included is a utility which can transfer tape software to disc.

Czech deal for Maxwell?

LARGE NUMBERS of Sinclair machines may soon find themselves behind the Iron Curtain. Sinclair Research has been trying to strike a major deal to supply computers to Eastern bloc countries for some months, and the recent relaxation of export regulations on hi-tech products removes one of the last hurdles.

The strategy has been endorsed by new owner Robert Maxwell who, born in Czechoslavakia, has strong business links with the Eastern bloc. He has decided to personally head the sales drive, and that added impetus may well tip the balance in favour of an advantageous deal.

The move is clearly an attractive way of clearing the £30m stocks of unsold computers and televisions which brought Sinclair Research to its knees in the first place. Maxwell is not particularly worried about the silicon mountain he has acquired. "I don't think the stocking is so horrendous," he says. "We have a chance of selling some to the USSR and Bulgaria providing we don't break the rules."

The Russian market looks particularly attractive. The Soviet Government has grandiose plans to introduce computers into all its schools; a contract on that scale is surely a mouth-watering prospect for any home computer company.

more news on page 8

The winning formulae

OMNIBOT robots and Ultimate goody bags were won by S Bowden of Hayes, Middlesex; Jeffrey Guy of Latham, Lancashire and Neil Gidman of Stoke-on-Trent, Staffordshire in our May Ultimate competition.

The seven runners-up, who also received goody bags, were: Stephen Chown, Seaford, East Sussex; Neil Walker, Sunderland, Tyne and Wear; S Miles, Merseyside, Wirral; W Armstrong, Houghton-le-Spring, Tyne and Wear; A Were, Cowley, Oxfordshire; K Pridmore, Anlaby, East Yorkshire; and Tristan Kayes, Reading, Berkshire.

The 100 winners of the Formula One competition in the June issue were: Bruno Grahpa, Varese, Italy; Ugolini Gabriele, Roma, Italy; C A Martin, Haywards Heath, West Sussex; Guy Corvers, Beringen, Belgium; Marie McNally, Reading, Berkshire, Mark Nurse, Withersea, East Yorkshire; A O'Connell, Liverpool L25; Barry Lennox, Raby Mere, Merseyside; Paul Drysdale, Kirkcudbrightshire, Scotland; Stephen Blackledge, Kendal, Cumbria; Ian March, Chellaston, Derby; Ian Grant, Watford; I Brett, Burton-on-Trent, Staffordshire; David Brown, London SW1; K Richey, Holywood, County Down; D R Whittall, Christchurch, Dorset; A D Hennings, Crowthorne, Berkshire; Alex Graham, Clifton, Bedfordshire; I Dex, Dunbartonshire, Scotland; Michael Faulder, Cockermouth, Cumbria; Matthew Stone, Didsbury, Manchester; A Walton, Farnworth, Bolton; Peter Duggan, Romford, Essex; Colin John Hay, Romford, Essex; Chris Dickson, Middlesbrough, Cleveland; S Holt, Rossendale, Lancashire; Graham White, Ingatestone, Essex; D J Stew, Witney, Oxfordshire; P W Gleed, Cowley, Oxfordshire; K Alexander, Morden, Surrey; P Basnett, Wallasey, Merseyside; Robert Hall, Witney, Oxfordshire; D Bevington Smith, Purley, Surrey; Kan Wai Wong, Gillingham, Kent; Nigel Rae, Lanark, Scotland; Robert Vogt, Aylesbury, Buckinghamshire; Avril Greenland, Hammersmith, London W6; Joao Filipe Falcao Roque, Coimbra, Portugal; Hani Abu Rahmeh, London SW1; Robert Jex, Dundee, Scotland; Edward Stutt, Beverley, North Humberside; Shane Parker, Bristol, Avon; Karl McCormack, Stafford; Maynard Paton, Doncaster, South Yorkshire; Gereint Jones, Rhondda, South Wales; G R Dormer, Bozeat, North Hampshire; C Gibbs, Cheshunt, Hertfordshire; K Welborn, Knaresborough, North Yorkshire; P Dobson, Harrogate, North Yorkshire; Dean Spencer, Nottingham; Aaron Warbuton, Belfast; P C Inskip, Kingswinford, West Midlands; Chi Wah Yau, London NW1; A P Hooper, Taunton, Somerset; W Kemp, Westerham, Kent; James Turner, Oakwood, Derby; G Zentner, Hazefiran, Jerusalem; Andrew Watson, Woodthorpe, Yorkshire; Adrian Leighton, Felsted, Essex; A J Logie Campbell, Cheltenham, Gloucestershire; Haydn Padmore, Woodlesford, Leeds; Karina Bate, London SW15; Stuart Barrick, Norwich, Norfolk; W C Erith, Camberley, Surrey; Paul Barr, Hull; Mark Chung, Levenshulme, Manchester; Barry Haddow, Alva, Clackmannshire; Jonathan Angeloni, Swansea, West Glamorgan; Peter Phelps Jones, Leeds; G Ward, Reme, BFPO 24; Ian Doggett, Kirton, Ipswich; David Stagg, Biggin Hill, Kent; Martin Johansson, Hjo, Sweden; W H Graumans, Haacht, Belgium, John Stephenson, Church Stretton, Shropshire; P J Irwin, Chiswick, London; Robert Whittaker, Dunboyne, County Meath, Ireland; K C Grove, RAF Laarbruch, BFPO 43; Robert Morris, Croydon, Surrey; Michael Grove, Warleys, West Midlands; M White, Bath, Avon; I J Grayson, Banstead, Surrey; Mr T Irwin, Bristol; Paul O'Neil, Worsley, Greater Manchester; Paul Carson, Ashford Common, Middlesex; N P Gardner, Stroud, Gloucestershire; Hazel Joy Hart, Beckenham, Kent; E Goodman, Barnsley, South Yorkshire; Ian Calderbank, Huddersfield, West Yorkshire; James E Taylor, Oldham; Paul Sadler, Ipswich; R Van der Vlis, Haarlem Holland; Lee Smith, South Nutfield, Surrey; Gareth Williams, Ruthin, Clwyd; Alistair Verheijen, Wirral, Merseyside; Martin Donnelly, Edinburgh; Jeff Bate, London SW15; P Kelly, Doncaster; Peter Zammitt, Wirral, Merseyside; S P Evans, Selly Oak, Birmingham.

All receive copies of **Formula One** from CRL. The winner of the Grand Prix video cassette is A Quinn of Redditch, Worcestershire.

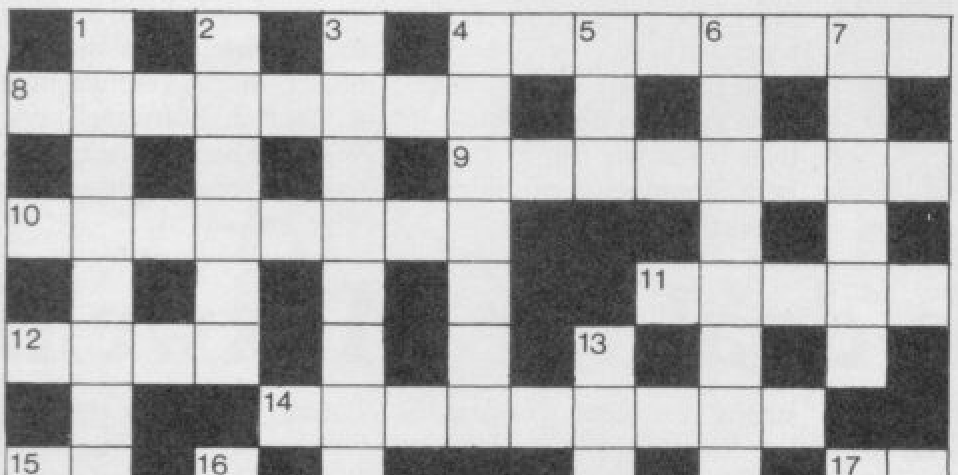
Hackers in the dock

ROBERT Schifreen, 21, of Edgware, north London and Stephen Gold, 29, of Sheffield have been charged with a further nine counts under Section 1 of the 1981 Forgery and Counterfeiting Act.

Appearing at Bow Street Magistrates Court on June 12 to answer two accusations, each involving alleged unauthorised entries into Prestel computers, the prosecution announced a further five charges against Schifreen and four against Gold.

Both men own Spectrum computers and were first arrested last March — see June's *Sinclair User*. Bow Street magistrate R Bartle again put the defendants on unconditional bail and remanded the case until July 4 to give the defence time to prepare its case.

ZXWORD by Henry Howarth



Across

4. Not a straightforward addressing mode (8)
8. Token MPs form joystick company (8)
9. ADA rate a misfit with place for information (4,4)
10. Address to a 'Blues' gathering? (8)
11. Lucky opportunity for reset key (5)
12. Sort of storage measured in kilograms (4)
14. Fraction of hex 64 (9)
15. Load a Z80 mnemonic (2)
17. BBC monitor? (2)
18. Consistency of laser light sources (9)
21. Jump over instructions in a large box (4)
22. A pornographic one could be nasty (5)
23. Cyclic binary system sounds like dull programming (4,4)
24. It's processed in a dry run (4,4)
26. King or me to form Wally's label (8)
27. See five, we hear, for example (8)

Down

1. It could be qwerty, in an upper sort of case (8)
2. Temporarily stores on reels of tape (6)
3. What a well written program must be (10)
4. Addressing mode found in the back of the book by the editor (7)
5. Matrix element on the printer? (3)
6. Ear rated poorly for access speed (4,4)
7. Axe College of Further Education plan for teletext (6)
13. Performance tests for hardware or software (10)
16. Not a foreign market for home computers, perhaps (8)
17. Tiddles plays with knobs in the west (8)
19. Finish to chess encounter? (3,4)
20. Sort of programming which follows a straight line (6)
21. Part of track insect originated (6)
25. Initialised analogue to digital converter (3)

Solution on page 110

New releases

RUPERT, that trendy bear in yellow-check trousers, has made it to the computer screen. Join him in search of a riotous night in **Rupert and the Toymaker's party** from Quicksilva. Out in August at £7.95.

US Gold is to launch **Pole Position**. Licensed from Atari, it will be in the shops this month for £7.95.

Melbourne House is bringing out a number of games. **Terrormolinos** is a graphic adventure about the trials of a Spanish package holiday. Full of greasy chips and screaming kids, it sounds fun and will be out in August for £7.95.

Mugsy's Revenge follows the success of **Mugsy** and is an adventure. It should be available in September at £7.95.

Marsport from Gargoyle is the first in a trilogy in which you have to retrieve secret plans from an abandoned spaceport on Mars. Look out for it in September at £9.95.

Firebird is to release two games — **Cylu** for the Silver range at £2.50 in August and **Elite** for the Gold range possibly in September.

Cylu sounds very similar to Ultimate's **Alien 8. Elite** is a simulation combat and trading game in which you must voyage through eight galaxies and 2000 planets in your space ship.

The Secret Diary of Adrian Mole aged 13¾ is now a computer game. Programmed by Level 9 for Mosaic, you must help Adrian work out the problems which crop up in his young but complicated life. To be released in September at £9.95.

From Silversoft comes **Baal** — an arcade adventure with similar graphics to **Alien 8** (again?). Baal, an apprentice devil must prove his worth before being allowed to steal souls from earth. Work your way up the levels to get out of hell. **Baal** will be out in August for around £9.00.

Silversoft is also releasing **Greatest Hits** for £7.95 — a compilation tape containing **Orbiter, Ground Attack, Worse Things Happen at Sea** and **Hyperaction.**

Boxing games have taken the software houses by storm. **Rocco**, from Gremlin sounds very similar to **Punch Out!!** the arcade game and follows close on the heels of **Frank Bruno's Boxing** by Elite. **Rocco** is available for £7.95.

Monty on the Run to be released in October for £7.95, continues the saga of the accident-prone mole. Help Monty escape to Brazil by getting him to the port before the ship sales.

Blade Runner from CRL is based loosely on the film and arcade game. Protect civilians in the crowded streets by destroying androids. It will be out in August for £8.95.

Seiclone from Hewson is an adventure space movie played in a similar way to **Dragontorc.** Solve problems while battling with the Seiddabs to gain control over them. **Seiclone** will be out in early October at £7.95

Mikro-Gen has come up with a box of tricks which will overwrite the Spectrum ROM and enhance the memory by 50 per cent. The hardware will hold part of the program and also the tape loading routine. **Shadow of the Unicorn** will be the first to use the hardware and will be launched at the PCW show in September for £14.95. It is a role playing adventure in which you control 10 characters.

Elite is to bring out **International Basketball** at the end of this month for £5.99. Stay in control of the field and learn to pass and handle the ball with your team.

GALLUP TOP 30

This chart is compiled by Gallup by sampling sales at 250 retail outlets, including high street chain stores and independent home computer shops

MONTH ENDING JUNE 21

1	SOFT AID	QUICKSILVA/VARIOUS
2	SPY HUNTER	US GOLD
3	WORLD SERIES BASEBALL	IMAGINE
4	STARION	MELBOURNE HOUSE
5	SHADOWFIRE	BEYOND
6	FINDERS KEEPERS	MASTERTRONIC
7	BRUCE LEE	US GOLD
8	EVERYONE'S A WALLY	MIKRO-GEN
9	ROCKY HORROR SHOW	CRL
10	FORMULA ONE SIMULATOR	MASTERTRONIC
11	DEATH STAR INTERCEPTOR	SYSTEM 3
12	DRAGONTORC	HEWSON CONSULTANTS
13	MOON CRESTA	INCENTIVE
14	RAID OVER MOSCOW	US GOLD
15	GYRON	FIREBIRD
16	MINDER	DK'TRONICS
17	GREMLINS	ADVENTURE INTERNATIONAL
18	BOOTY	FIREBIRD
19	CHUCKIE EGG II	A & F
20	HERBERT'S DUMMY RUN	MIKRO-GEN
21	DALEY THOMPSON'S DECATHLON	OCEAN
22	MATCH DAY	OCEAN
23	TAPPER	US GOLD
24	ALIEN 8	ULTIMATE
25	GRAND NATIONAL	ELITE
26	MANIC MINER	SOFTWARE PROJECTS
27	CHILLER	MASTERTRONIC
28	STARSTRIKE 3D	REALTIME
29	DUN DARACH	GARGOYLE
30	BRIAN JACK'S CHALLENGE	MARTECH

QL beats the field

THE MICROCOMPUTER of the Year is the QL, according to the judges of the British Microcomputer Awards.

The award was accepted by Sir Clive Sinclair who received a standing ovation at a ceremony in London, arranged by Thames Television, the *Sunday Times* and VNU Publications. He also picked up the VNU Educational Award for the Spectrum version of **Logo**, programmed for Sinclair Research by LCSI.

Psion chairman David Potter also received a trophy when the Psion bundled exchange packages for the QL won the Thames Home Software Award. Matthew Gaved of Psion commented ecstatically: "Fantastic, marvellous. We are very, very pleased. It is good news for Sinclair and it shows that the QL is still alive and well."

The company has recently shown its continued support for the QL with the launch of **Match Point**. The game is a conversion of the best-selling Spectrum tennis simulation.

Also, a new version of **Archive** is to be made available. Called the **Archive Runtime Module** it is a stripped down version of the original which will compile data manipulation programs written in its own Super-Basic derived language.

Psion believes that the new version of Archive will mainly be used by software houses who want to compile routines for the program. It will, however, also be available on the consumer market.



Sir Clive, lit up with delight

The future operation

THE OS-9 operating system, capable of turning the QL into the equivalent of a high speed mini computer, is on the way courtesy of disc drive manufacturer Cumana.

OS-9 will be available as a hardware add-on in September, with QL compatible disc drives and interface.

Clive Martin of Cumana says, "We see OS-9 as being the operating system of the future for both the QL and the BBC microcomputer."

Planned software for OS-9 includes word processors, databases, a fast version of Basic and a C compiler. Cumana also plans to add hard disç on the hardware front. Martin comments, "The whole system will be very Unix-like".

A data sheet on the disc drives and operating system is available from Cumana, The Pines Trading Estate, Broad Street, Guildford, Surrey, GU3 3BH.

Boo for Basic

A COMPLAINT regarding SuperBasic has earned a rebuke for Sinclair Research from the Advertising Standards Authority.

It said Sinclair could not claim its QL language to be "the most powerful Basic ever devised'.

Pascal makes the grade

A PROUD Metacomco has just received its ISO validation certificate for the **Pascal** development kit.

The ISO standard is closely adhered to by manufacturers of major business software publishers. It is something of a coup for the Metacomco package to be included amongst those which are acknowledged as meeting the standard.

A spokesman for the company says, "We have sold 500 packages so far, which is good considering the state of thę market. We are also thinking about special productions for universities. We may give educational establishments 30 or 40 per cent reductions."

Sinclair User was the first magazine to point out the outstanding quality of the Metacomco package in its Classic review in July.

Drive to win

HYPERDRIVE is the first QL motor racing game.

The package is to be launched by the English Software Company. It features 3D perspective graphics, five levels of play, sound effects and a joystick control option.

Printing in protocol

A HARDWARE system which makes the QL compatible with any type of printer has been launched by A Line Dataspeed Services.

The company offers a Protocol converter which connects virtually any type of computer to any printer. It does not matter whether the printer uses serial, parallel or IEEE-488 standards.

More information can be obtained from A Line Dataspeed Services Ltd, 3 Auburn Road, Blaby, Leicester, LE8 3DR.

Basic compiler arrives

A FULL SuperBasic compiler, priced at around £80.00 is the latest in a range of products announced by Digital Precision.

The two-pass optimising compiler, which will work on all versions of the QL starting with AH, provides facilities found on few other such products. Most interesting is its ability to optimise execution times of the object code when it has been compiled from SuperBasic.

Tony Tebby's Toolkit commands are also supported. The compiler will go one better than SuperBasic by supporting a nine digit numeric format instead of the usual seven.

Freddy Vaccha of Digital Precision says, "We believe that the compiler is a market beater. At the moment we regard Psion **Chess** as being number one in the QL charts but the compiler will replace it in that slot."

Other Digital Precision products due for release are an astrology program and two arcade games. Vaccha is pleased with the astrology software: "It uses astronomy calculations and produces a detailed character analysis".

All products from Digital Precision should be available at the end of August.

Putting Denton's record straight

HAVING read the article about Denton Designs in your July issue, there are a few points I would like to make.

Firstly, in 12 months, with a quarter of Imagine's programming staff, they have produced more and better products than Imagine did in it's last 12 months. This would seem to indicate that when at Imagine they were grossly mismanaged, and/or working for themselves has spurred them to greater productivity.

Secondly, whilst I appreciate Steve Cain saying that I have calibre, I do not understand his reference to 'cock ups'. At Imagine I was in charge of sales and marketing, which are generally regarded as having been Imagine's strengths. Denton does not have sales or marketing because they recognise their lack of ability in these areas; that is why Beyond and Ocean do it for them. Steve Cain is not qualified to pass comment on my skills, just as I am not on his skills.

Thirdly, it is refreshing to find that Denton Designs has inherited Imagine's lack of false modesty.

To conclude, I wish Denton Designs and all who work there, the best for the future. Their skills and originality are what this market needs and make a happy change from the plagiarized junk produced by many people.

Bruce Everiss, Wirral, Merseyside

● *The comments made by Steve Cain of Denton Designs in respect of Bruce Everiss's capabilities as a sales and marketing director are not endorsed by the editorial staff of* Sinclair User. *We apologise to Bruce Everiss for any inconvenience and embarrassment caused.*

I HAVE just read the Hit Squad interview with Denton Designs July 1985. I believe the paragraph detailing programs written by Denton Designs to be misleading.

In the list of games given you include **World Series Baseball.** The Spectrum version of the game was not written by Denton Designs, but by Platinum Productions for Imagine '85, which is owned by Ocean.

David Anderson, Platinum Productions, Kilwinning, Ayrshire

Rating scores no points

I HAVE always relied on the Gilbert factor when buying a game. Now I find you have changed to star ratings. Gilberts are much better, please bring them back.

As to David J Anderson's totally despicable letter against women reviewing games — May 1985. Your interviews have not been 'scraping the barrel' although I would like to see an ACG interview.

Max Schaefer, London SW11

Take up thy C5 and run

LET US hope your comments – Adventure, July – concerning the copyright hassles that Delta 4 hope to avoid by 'changing the names and aims' in their game **Bored of the Rings** are well founded.

I feel sure that some of the Harvard Lampoon team which published the original *Bored of the Rings* might recognise the work as a copy of their own.

I look forward to being informed that (a) it is all Delta 4's work and coincidences do happen; (b) it was an oversight and they thought the book would be mentioned: (c) you enjoyed reading the book; or (d) who cares what the yanks think and I can take a running jump.

P J Bird, Northfield, Birmingham

● *The correct answer is (d). The game is a spoof of Tolkein's* Lord of the Rings *with all names and places changed and not a copy of the American book. Apparently, the title is not copyright.*

Lampooning a copyright

I WOULD like to reply to J Talbot and J Paton – June, letters – who criticised my earlier letter about the C5. I can't believe J Paton stating that the lack of cycle paths is to blame. You don't build an aeroplane and wait for someone to build a runway!

The C5 is also too easy to steal. All you have to do is hop in and off you go. If you want a faster getaway then try picking it up and running with it under your arm.

Dietmar Osman, Farnham, Surrey

Take two for a Tasword count

I WAS interested in your article Customising your Word Processor, May, *Sinclair User*.

I attempted to introduce into my Tasword the Word Count, resulting in a crashed program.

Philip Muston, Richmond, Surrey

● *THE MOST common problem with the Word Count routine is once you have saved the code to tape you should load Tasword, add the additional Basic and enter CLEAR 31940 as a direct command before loading the word code. To call the routine RUN Tasword, go to the STOP menu and press W.*

To display the word count option in the menu, alter lines 25 to 80. Those vary according to which version you own.

The header, in listing 4, should be put in line 270 with the REM removed and the REM in line 294 should be removed to print the footer.

In line 220 the FN in the second statement is a Keyword, reached by going into E mode, holding symbol shift and pressing 2. For clarity you could also alter the middle of line 200 to read: LET a$= "Text Lines per Page (";PEEK 31940;")":

No peace study bias

I AM disappointed by two things in your June issue which seem based on ill-considered statements.

The first was the inference by Gremlin that Ronald Reagan is about to start a nulear war. Surely that is too trite.

More serious was Theo Wood's claim about peace studies. What is 'unbiased' about teachers wearing CND badges while teaching the so called peace lessons?

I am pro Mr Reagan and Mrs Thatcher but would not seek to dismiss their opponents with a couple of off-the-cuff remarks.

Michael J King, Bentley Heath, Solihull

● *Theo Wood did not use the word 'unbiased' and made no references to CND badge-carrying teachers. She did, however, say that the program "is informative without being biased."*

Gremlin made no such inference about Reagan's itchy trigger finger. Your right-wing paranoia is obviously working overtime, Ed.

When the body can't take it

THE INFINITE lives poke for **Fantastic Voyage** — July 1985 — needs correcting. Change CLEAR 30791 to 30719.

When the body overheats, stop the infections with the following program.

```
10 CLEAR 30719
20 LOAD 'VOYAGE' CODE
30 POKE 54492,0: REM inf lives
40 POKE 54227,0: REM stop infection
50 BORDER 0
60 PRINT USR 53248
```

Does anyone know where the seventh piece is?

Timothy Smith, Grays, Essex

Getting Gilligan down the mine

I HAVE recently purchased **Soft Aid** which contains **Gilligans Gold** and find the game addictive and enjoyable. If any one is having problems, follow these instructions.

Picking Up
Position Gilligan in front of the object, facing it. Press the Action key. Gilligan should pick up object. If not, try the process again in a slightly different position. To drop, press the Action key.

Using Pit Bus
Stand under a black arrow when bus route is clear. Press Action key and you should hang horizontally. When pit bus is directly under you press the Action key. You should drop down into the bus. If you miss try again. To get off, press left or right or if there is a ladder, up or down.

Pushing Wheelbarrow
Stand, facing the barrow so that Gilligan's hand is on the handle. Press the Action key and push the barrow where you like. To drop the barrow, press Action key.

Richard Newell, Shrewsbury, Shropshire

Endless lives are bootiful

HERE ARE some infinite lives for **Booty**. Type in the program then load as normal.

```
10 BORDER 0: PAPER 0: INK 0
20 CLEAR 26870
30 LOAD "" SCREEN$
40 BORDER 0: PAPER 0: INK 0
50 PRINT AT 19,0: LOAD "" CODE 26880
60 RANDOMIZE USR 26880
70 POKE 58294,0
80 RANDOMIZE USR 52500
```

Darren Hutchinson, Pitalpin, Dundee

Starion's role in history

HAVING trouble working out some of the anagrams and dates in **Starion**?

In sector one, the first anagram is Bible and the date is 1968; the second is EEC in 1957. The next is Diamond and dates from 1897 and lastly, Relativity with a date of 1905. I hope those help you on your way.

Julian Marshall, Abingdon, Oxfordshire

Rigging the records . . .

HERE IS the format of the 62 byte service record and a method to create your own fake record for those wishing to play **Psytron** on all six levels.

Bytes 1-23 your name; Byte 24 header (202); Bytes 25-60; 36 bytes of score information, for each of the six levels, five previous scores and the average score; Bytes 61-62 checksum of bytes 25-60.

The following program will create a service record of 99 per cent for each level.

```
10 FOR N = 33001 TO 33023
20 POKE N,66
30 NEXT N
40 POKE 33024,202
50 FOR N = 33025 TO 33060
60 POKE N,99
70 NEXT N
80 POKE 33061,236
90 POKE 33062,13
100 SAVE "FAKE" CODE 33001,62
```

Run this program but do not start your tape for the SAVE until the first bloc — Spectrum header — has been sent. You now have a service record which you can load to play at any level.

Colin and Roger Bennett, Madrid, Spain

Escape from the Sidhe . . .

IF YOU ARE having trouble getting past Sidhe Olcweed and those nasty faces in **Tir Na Nog,** press key 6 once you have been killed to return to the menu. Pressing 1 returns you to where you were — you can't move straight away but you are alive and well.

Chris McGrail, Mostorough, Sheffield

Pitch bugged on Match Day

I WOULD like to point out some bugs in Ocean's **Match Day.**

When the ball is kicked by a player towards a goal-post, it sometimes appears to rest against the post and neither player can move it.

If a player scores just on half time or full time, the clock carries on for 90 minutes before the match restarts and then the clock goes haywire and returns to zero.

Sometimes the players can run around with their hands in the air after a goal even when scored by the opposition.

Steven Knott, Stockport, Cheshire

Sick as the proverbial . . .

I CLAIM to be Britain's worst **Match Day** player. I got beaten 15-0 on amateur the first time I played it. A few games later I was beaten 9-0. I've got better now, but my friend beats me every time.

Robert Looker, Eastleigh, Hampshire

Monty champ of the world

I CLAIM to be champion at **Monty is Innocent**. I completed it in one minute, 14 seconds.

Tony Winterbottom, Penzance, Cornwall

Kicking the Ninja

WHILE PLAYING **Bruce Lee** I noticed a nasty bug when Bruce arrives at the frame with three boxes — one holding the correct route, the other, two red herrings. If the first box is selected, you will be presented with a frame that has three levels and two doors. It you open the door on the lowest level, never kick or punch the Ninja so that he falls into the doorway. That causes the computer to lock up.

My final score is 1,314,900 with 15 falls remaining.

Philip Bond, Barry, South Glamorgan

SINCLAIR USER Classics are programs which, in our biased and eccentric opinion, set new standards in software. They are the programs by which the others should be measured. If you buy no other software, buy these. No self-respecting Sinclair user should be without them.

Software reviews carry a star rating, the basis of which will be value for money. Programming, graphics, speed, presentation, addictive qualities and the rest are taken into account.

Guide to ratings
★★★★★ 24 carat. Buy it
★★★★ Value for money
★★★ Nothing special
★★ Over-priced
★ A rip-off

Roland's Rat Race

ROLAND RAT, Superstar, renowned for talking the boom off the speed of sound, has forgotten to set his alarm clock. He is late for his regular appearance on TV-AM.

The sewers in which he lives, with buddies Kevin and Errol, are also inhabited by mutant wellie boots which stomp their way up and down the levels, kicking everything out of their way. Roland finds that a pain in the tail, and arms himself with a rubber glue gun, which can be filled with glue pots scattered around the levels. The glue puts the wellies into a sticky situation and he needs gallons of it to get to the studio door.

To open the door and join Nick, Anne and Wincey he has to collect pieces of glow-in-the-dark material, one bit at a time, and fix it to the door. He must then collect the key and fit it into the lock for the grand finale.

To further complicate matters there are two sewer levels. If Roland finds a downward arrow on the first level he can travel to the underground system.

The tubes rattle by frequently but Roland, unperturbed, walks at the side of the track avoiding the danger. If luck is on his side he will find a black door into which the glowing pieces of puzzle can be fitted. He must be fast, however, as the time ticks slowly onward and the show will soon be over.

Finding the pieces is hard work and Roland has had no breakfast. He must get by on a diet of Big Macs and crisps which will boost his energy level.

The game relies heavily on the player's identification with Roland, and those who are not enamoured with the Superstar might find that play can become monotonous after more than 30 minutes, although the C5 trundling across the top of the screen with the other rush hour traffic provides some light relief.

The various screens look deceptively similar, and map-making is essential if Roland is to avoid running around in circles.

The graphics, while not outstanding, are smooth and fast. The scroll from one room to another is particularly impressive.

Roland's Rat Race will be of interest to rat fans everywhere. Although he is not his usual verbal self his rambling computer adventures give a new meaning to cuteness on the arcade screen

In the final analysis, is it good fun? Yeah!

John Gilbert







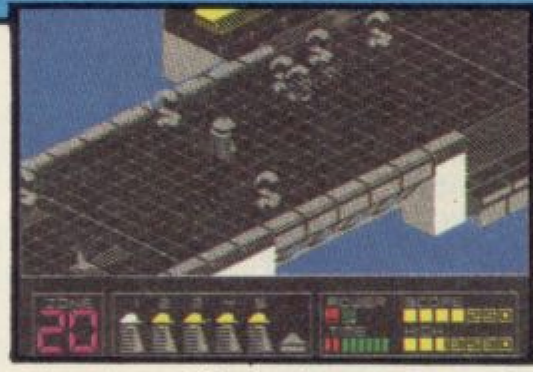
Publisher Ocean **Price** £6.90
Memory 48K **Joystick** AGF, Kempston, Sinclair
★★★★

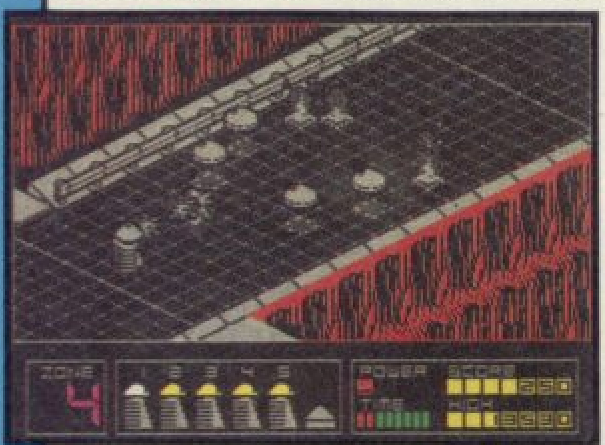
more software on page 16

Highway Encounter

THE ORDERLY advance of the aliens to destroy civilisation as Slugger would like it to be, is given a new twist in **Highway Encounter** from Vortex. The aliens stick to the main road, and your job is to ferry the lasertron to their base where it will obliterate the nasties.

The twist is the combination of state-of-the-art **Knight Lore** graphics with straight shoot-'em-up button bashing. The lasertron is propelled by a chain of five Vortons, dalek-like robots with guns in their heads. You control one Vorton at a time, but the other four will continue to move the lasertron forward if they can, and are thus vulnerable to attack. It seems particularly devious to design a game where you can lose your other lives before you even get to play them.





There are 32 screens of 3D highway to negotiate, each one containing a problem of its own. Some involve moving oil-drums around to prepare the way for the lasertron, others are free-for-all scraps with the aliens. The most difficult involve both.

The aliens have an innocent fury about them. Some look like rejects from a remake of *War of the Worlds*; others resemble psychotic eggs. Vortex promises staggering effects when the lasertron is finally brought to its destructive goal.

In many respects the game is superior to **Knight Lore** and **Alien 8**, in that everything moves faster and in a true eight directions. There is colour in the screens, though not much, and most importantly, the action continues off-screen so you can't hang about for long trying to work out the best tactics. Weaknessess include less variety in the problems, and the lack of a maze — the highway is a simple straight road, easy to wander along to the end, but much more difficult to negotiate with the lasertron in tow.

It is a long time since we last saw a Vortex game — **TLL** and **Cyclone** were the last products. **Highway Encounter** is the best yet, innovative and addictive, and should go down a treat this summer. *Chris Bourne*

Publisher Vortex **Price** £7.95
Memory 48K **Joystick** Kempston, Sinclair, cursor
★★★★★



Spy vs Spy

A PERPETUAL MADcap struggle has left the pages of America's top cartoon magazine to continue its conflict on the computer screen.

The comic capers of the two secret agents from *MAD* magazine reappear in Beyond's **Spy vs Spy**. A unique split-screen approach allows two to play simultaneously.

Ransacking a foreign embassy, the idiotic duo – one white, one black – blunder into each other's traps as they both search for secret documents and a diplomatic bag.

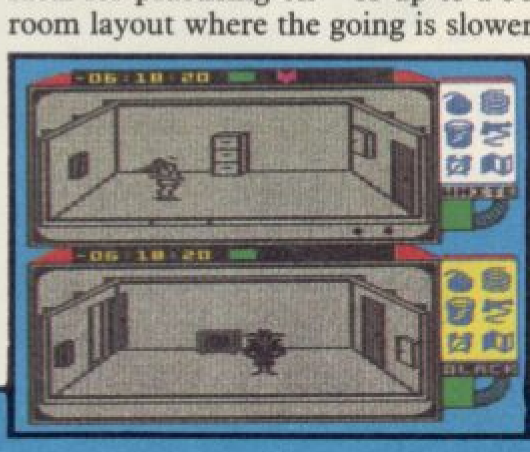
Hidden in the embassy are five objects which must be found before escape can be made in a super-slow and cranky bi-plane. The rooms all look alike so it is not surprising that you are constantly running into your own traps.

Buckets of water placed over doors, springs which send you hurtling across the room, are all part of the fun in trying to outwit your opponent. Those can be accessed through an icon-driven Trapulator and are easy to set once you've got the knack.

The two sleuths constantly cross each other's tracks and battle commences. Clubs magically appear as the two take wild swipes at each other. If you are lucky enough to score seven blows, your opponent ascends to heaven on angel's wings. After a short breathing space – in which the seconds still tick by – he is back for more.

Each time a confrontation occurs, any objects held are lost – either hidden in that room or throughout the building. It is the winner's privilege to search the room and either claim or reclaim articles.

You can play in a six room embassy in which the game is quickly over – ideal for practising on – or up to a 36 room layout where the going is slower and an element of cunning strategy is required. A two player game is more fun than playing against the computer – mainly because the computer nearly always wins.



Surprisingly, the game is not compatible with a Kempston single-port interface and will only take joystick interfaces which emulate the keyboard. A dual port interface is needed for two players and though the keyboard can be used, space is cramped.

The instruction book is lengthy, though well presented, and it takes a while to get the hang of the game. Instant play is not possible, but it's worth persevering.

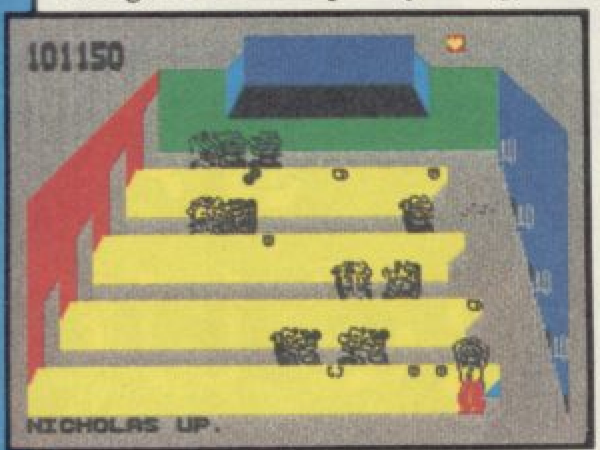
Spy vs Spy will probably be as successful as **Shadowfire**. Playing against the computer, however, is unexciting and frustrating. A two player game is another matter – it's challenging and there is more fun to be had outwitting a friend than a mere circuit board. *Clare Edgeley*

Publisher Beyond **Price** £9.95
Memory 48K **Joystick** Sinclair, Cursor
★★★★★

Tapper

THE SODA BAR is as much an American institution as blueberry pie or Grandma Moses. To judge from **Tapper**, the latest import from US Gold, the only character who hates it is the guy who serves the soda.

Your job in **Tapper** is to keep the refreshing fizz flowing as the customers queue for more. There are four bars, with several layers of play in each. First it's the turn of the cowboys, a fairly docile lot. Slide a drink along the counter quickly enough and

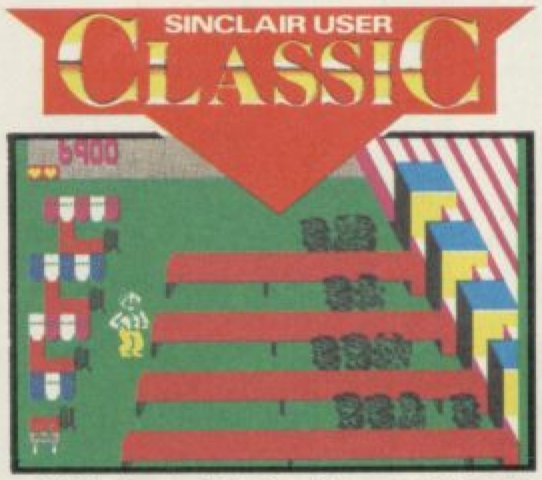


they'll take it and leave, but if a customer waits too long he'll stay around for another.

And that's where the trouble starts. Obviously impressed with your skill at delivering drinks, the customers tend to hurl the empties back at you. One mistake – a drink too many served, a glass on the floor, or a customer left unattended and you lose a life.

If you manage to satisfy the cowboys, you move to a duel of wits with the Soda Bandit. He swaps around the cans, after shaking all but one. Find the untampered can and you win. Open one of the others and you get a face full of froth.

Then it's on to the senior prom,



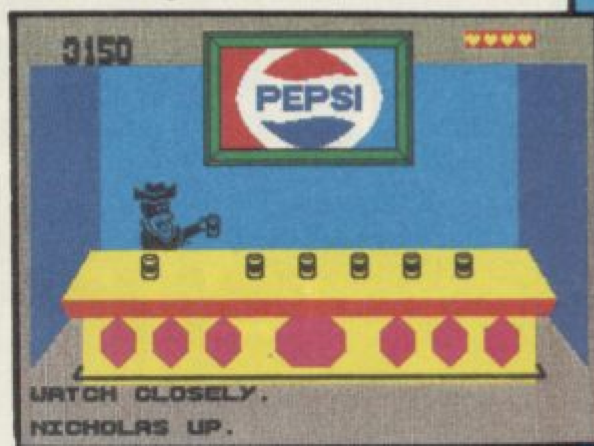
with jocks and their girls crowding the marquee. Life gets even more hectic when you graduate to a punk bar, although the balding bespectacled boys look more like fifties college wimps. Nice to see the colony still retains a touching innocence about British mores.

The final sequence involves aliens, just as eager for a slow Sarsparilla as anybody else. A lovely touch is the occasional appearance of a tip. Collect the tip and a pair of dancing girls perform on stage. That can be a blessing, as heads will turn and customers stop bothering you for a while. But serve a drink and they won't notice – so you have to be careful.

Tapper is simply delightful to play. It's surely the most addictive game released this year, and its theme is just right for the summer.

Graphics are clear, humorous and simple so that its easy to see what's going on. Problems can occur if the bar gets too crowded, so that two people in the same place create a blur. For once, that adds to the realism.

The action is extremely well-paced against the demands of the game. Its fast, but not fast enough to be impossible. As usual with US Gold products, the choosing of skill levels, joystick selection and so on is made very friendly. Highly complex arcade-adventures are all the rage at present, and it is good to see such a fine,



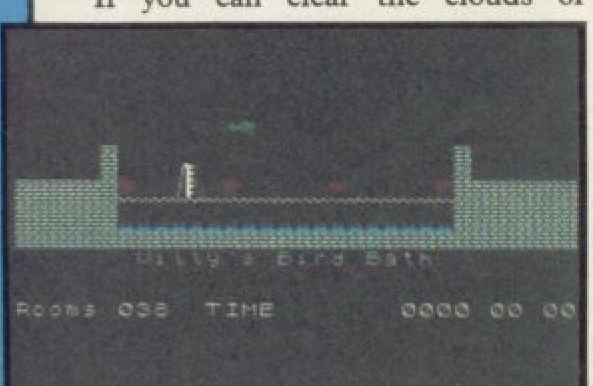
unpretentious classic arcade game released. If your brain has been completely drained by the mysteries of **Shadowfire** or **Gyron** of late, take a trip to the soda fountain. It's a refreshing experience. *Chris Bourne*

Publisher US Gold **Price** £7.95
Memory 48K **Joystick** Kempston, Sinclair, cursor
★★★★★

Jet Set Willy II

IT IS EIGHT months late, and Matthew Smith had very little to do with it. Nevertheless, it's here, and Miner Willy rises from the grave in the final part of the **Manic Miner** trilogy.

If you can clear the clouds of



nostalgia for a moment and look at the game objectively, it also seems to be the rip-off of the year. **Jet Set Willy II** is, in a nutshell, **Jet Set Willy** with about 70 extra screens.

The plot is the same – Maria the housekeeper won't let Willy go to bed until he's cleaned up the house. Unfortunately, builders have been to work. Rooms are not always where they were.

If you're puzzled by all this, **Jet Set Willy** was the ultimate ladders and levels game, launched in 1984 and one of the biggest selling games ever.

This expanded version continues in the same vein under the coding of D P Rowson, with rooms such as Maria in Space and Beam me up Spotty. Games attacked include **Alien 8**, and **Tribble Trouble**.

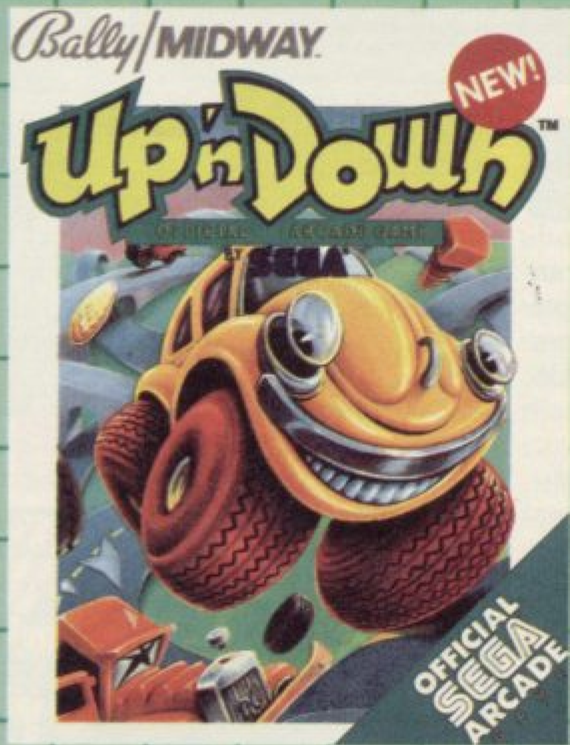
Jet Set Willy II is probably as tough as the original. The Banyan Tree is as vile as ever, as is the Wine Cellar. Graphics, which amazed us all at the time, now look dated, and the music does not improve with age. Movement is considerably faster, although the infinite death traps, where you cannot escape losing all your lives in quick succession, have multiplied.

If you already have **Jet Set Willy**, and have waited for the final game for a year, you'll probably be a little upset. If you never saw the original, then the sequel is the one to buy, and represents very fair value for a one-time classic. *Chris Bourne*

Publisher Software Projects
Price £6.95 **Memory** 48K
Joystick Kempston
★★★

more software on page 20







OUR ARCADE GA
HITS, WE BROUG

Here at Sega, we like to think we know a thing or two about quality. Our reputation has been forged in the World's most competitive market, the American arcades. Discerning arcade players; and they know a thing or two as well; have voted our games some of



the best of all time. They've enjoyed high speed action, breathtaking graphics, thrills and spills, variety and



innovation as one chart-topper has followed another.

But why should the arcade players have all the fun we were asked. Of course there was no reason at all; and so we decided to bring our games home and let all the family have a piece of the action. We have re-written the programs for many of the popular home computers and now everyone from junior to grandma can have a go!

Like chasing the mighty ape up Monkey Mountain in CONGO BONGO, number 3 in the Billboard Chart in 1984. You'll ride hippos, dodge charging rhinos and do battle with jungle creatures; but make sure you don't end up as a lunch time treat for a man eating fish!

Or you can have a smashing time with Bally Midway's UP'N'DOWN. This is a frustrated motorists dream; you bash your way over rough roads,

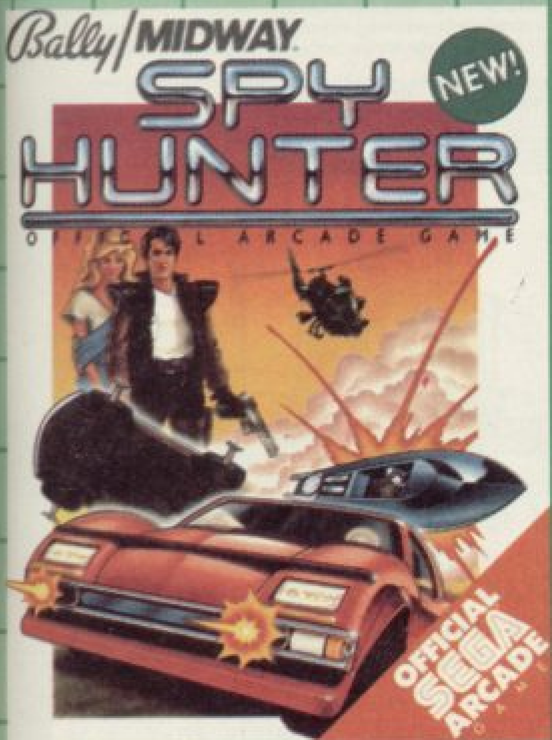


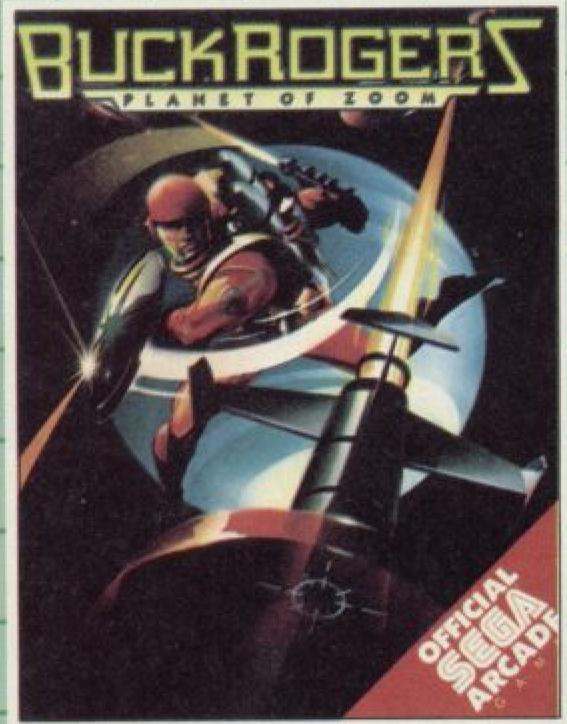
leap dead ends, canyons and crush anyone who gets in the way! No. 1 in the Play Meter Conversions Poll, UP'N'DOWN is one smash hit that really is a smash!

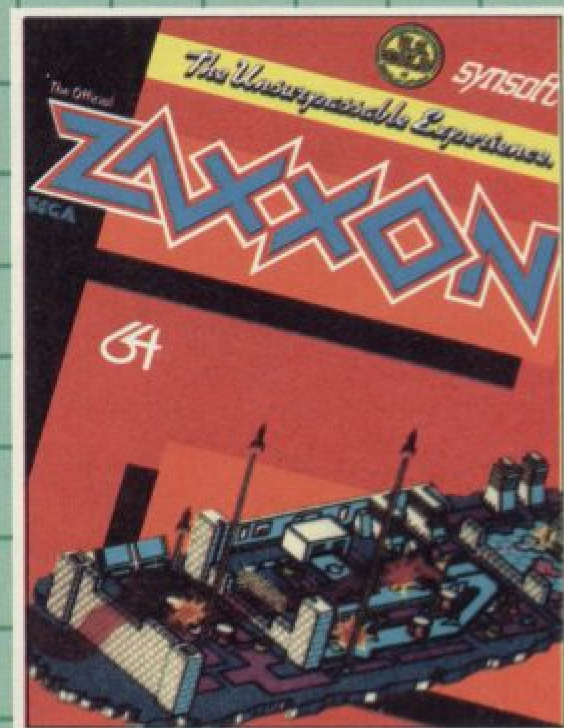
And if all that doesn't drive you to drink then TAPPER will! This has got to be the loudest, wackiest saloon bar there's ever been. The action gets truly out of hand as the overworked bar tender scrambles to serve his unruly (and very thirsty) customers.

	Commodore 64	Spectrum	Amstrad
SPY HUNTER	NOW	NOW	SOON
TAPPER	NOW	NOW	SOON
UP'N'DOWN	NOW	SOON	SOON
CONGO BONGO	NOW	SOON	SOON
ZAXXON**	NOW*	NOW	SOON
BUCK ROGERS	NOW	NOW	SOON

*Published by Synapse Software Corp. under licence from Sega Enterprises Ltd. **Atari version of ZAXXON available on cassette and published by Datasoft Inc. under licence from Sega Enterprises Ltd. Videogame copyright © 1983 Sega Enterprises. Ltd. Bally Midway is a trademark of Bally Midway Mfg. Co. Package and program copyright © 1984 Sega Enterprises. Inc. TAPPER and SPYHUNTER are trad







MES WERE SUCH BIG
HT THEM HOME!

Work your way through the wild Western Saloon to the Sports Bar. From there to the slam dancing Punk Bar and into the Space Bar where the customers really are out of this world!

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EXCLUSIVE

Southern Belle

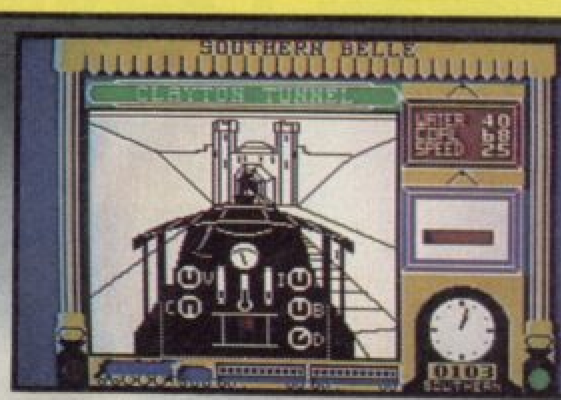
TAKE YOUR SEATS for the 12 o'clock service from London Victoria, calling at Clapham Junction, Merstham, Haywards Health and all stations to Brighton. The *Southern Belle*, the famous Pullman service of the 1920s, is stoking up for a final run.

Hewson Consultants has attempted to capture the trials of life in the engine cab in a full simulation of one of the most elegant trains of all. You must control a 4-6-0 King Arthur Class locomotive, regulating the steam pressure, shovelling coal into the boiler, obeying signals, and even blowing the whistle at the correct times.

The screen display shows the interior of the cab and the features of the track as they pass by. Those include 24 stations, tunnels – including the twin-towered Clayton tunnel — signal boxes, Battersea Power Station, and other landmarks.

Controlling the train is not easy, in spite of a comprehensive booklet including a history of the line. Gradients are included, and to score full points you must make it to Brighton on time, using an economical amount of coal.

There are a number of training modes, where the computer controls many of the functions, and the full run includes weather hazards. There is a high-speed demo as well, but the whole trip is in real-time, so you will not finish in under an hour.



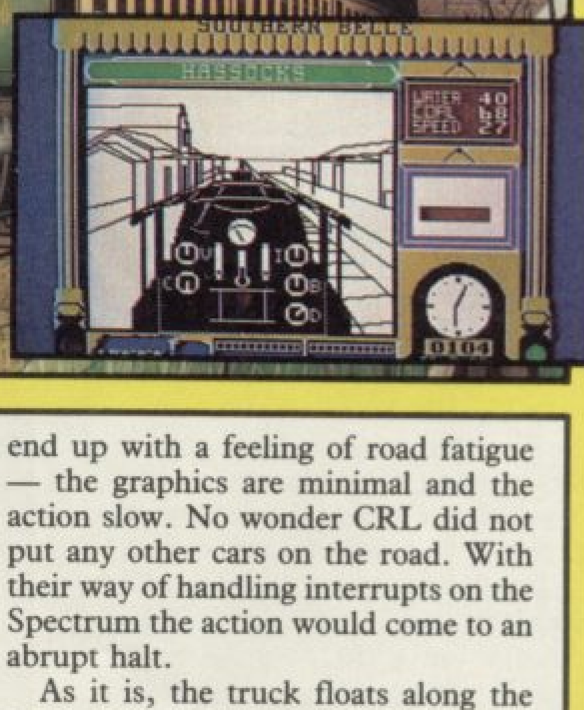


The version we saw was a pre-production copy, with many of the control features not fully operative. Hewson promises further landmarks and decoration on the screen, as well as information about hazards and signals. Our rating is therefore provisional and may be updated in a later issue.

Train lovers will certainly enjoy a good, solid simulation, and those who are used to flight simulators may find a day's outing on the **Southern Belle** a refreshing change from airport mayhem.

Chris Bourne

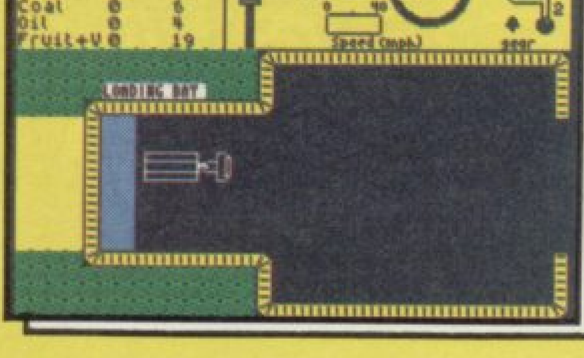
Publisher Hewson Consultants
Price £7.95 **Memory** 48K
★★★★



EXCLUSIVE

Juggernaut

SOME simulations are fun, others can be downright boring. **Juggernaut** fits snuggly into the second category with a trip around town in a container lorry, trying to pick up cargo.



The loads include fruit, veg, timber and coal of which you must take enough to meet targets set by your manager.

Your trip starts at a depot picked at random and shown on your map as a flashing square. Putting the truck into first gear and pressing down the accelerator will give forward movement. Moving too fast may take you into a wall, or through the trees.

The first move should be to find a telephone and make a call using the main icon-driven option. A map appears and you are told where your cargo may be picked up. To load cargo you must back into the docking bay and press the load icon.

Although the simulation bears some resemblance to real life — you may end up with a feeling of road fatigue — the graphics are minimal and the action slow. No wonder CRL did not put any other cars on the road. With their way of handling interrupts on the Spectrum the action would come to an abrupt halt.

As it is, the truck floats along the lonely road bearing a striking resemblance to a Gillette GII razor. If that is vector scan graphics you can keep them.

A lot more thought could have made it an original simulation. At present it is just a bad simulation of a simulation.

John Gilbert

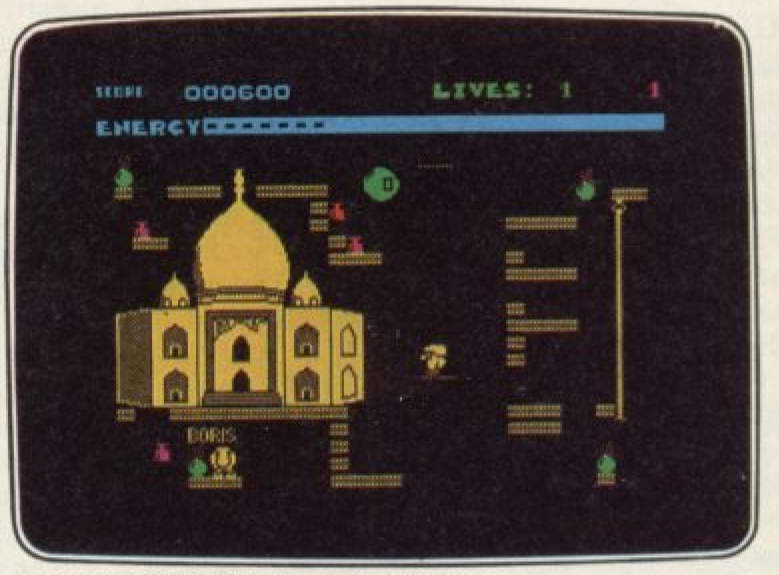
Publisher CRL **Price** £9.95
Memory 48K **Joystick** Kempston, Sinclair, cursor
★★★

more software on page 22

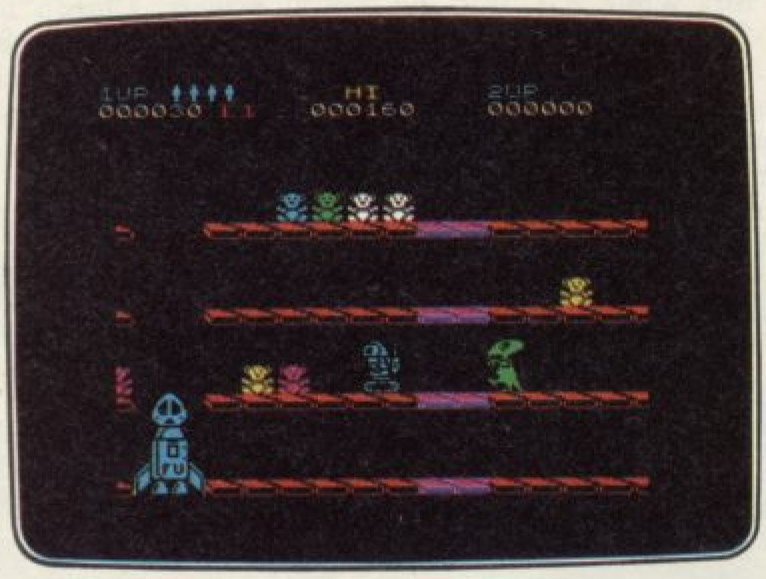
SILVER RANGE . . . Seeing is believing



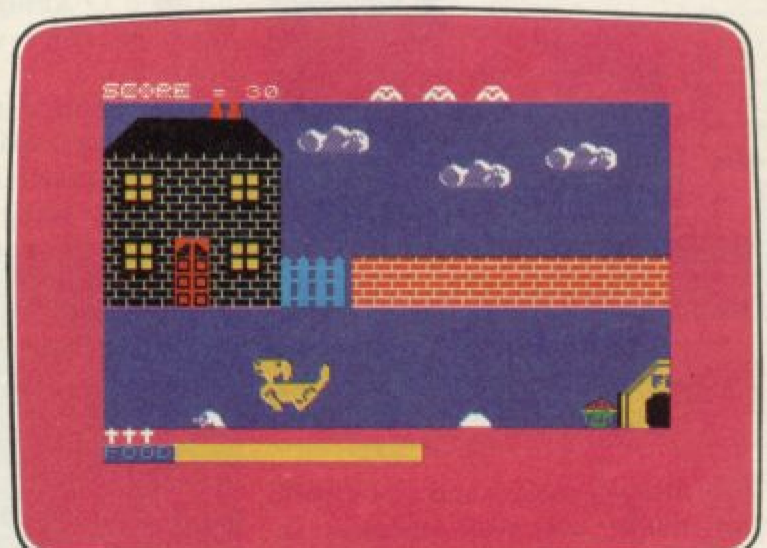
SUBSUNK Adventure with Graphics
Trapped on the sea bed in a scuppered submarine



SHORT'S FUSE Arcade/Strategy
Sam Short secret agent versus Boris and his bombs



DON'T PANIC Arcade/Strategy
Amusing and challenging, a game with a difference



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Cluedo

MURDER is the only illegal move you are allowed to make in **Cluedo**, the authorised computer version of Waddington's board game.

As a firm believer in cheating, Leisure Genius left me smarting. What fun is **Cluedo** if you cannot hide the identities of your clue cards or make suggestions about locations which you hold in your hand?

Cluedo closely follows the original board game, using exceptional graphics to depict the board and the 3D dice which roll over it. When a player enters a room and makes a clue suggestion a view of that room appears. The switch between displays is incredibly fast and expertly done.

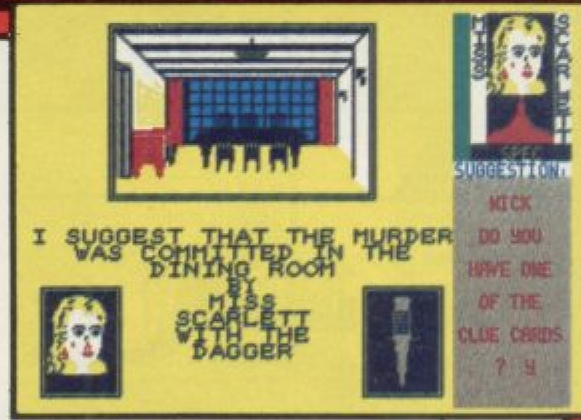


Once chosen, the characters are assigned clue cards which depict locations, suspects and weapons. One card from each of those catagories is chosen by the computer to form the situation for the murder. The characters must then move around the locations asking whether other players have particular cards which, once seen, can be eliminated from their enquiries.

Movement and suggestion phases form the main part of the game and the speed at which those cycles take place can be controlled at the start.

The sound effects slow down play considerably. They introduce players onto the screen as their turns roll around. Music includes *Onward Christian Soldiers* for the Rev Green, *Air on a G String* for Mrs White and *Land of Hope and Glory* for Mrs Peacock.

The grand denouement can come when a player makes an accusation. It is a one-time-affair for that player and it is done using three menus from which the choice is selected. If wrong,



the player faces expulsion from the game. The computer can then either take over the play of the loser's cards, the player can keep them but not participate, or the game can be ended.

The big advantage that computer **Cluedo** has over the board game is that you can play against the computer at any time. You do not need a full complement of friends.

The Spectrum is certainly not a good competitor for all its large memory and logical powers. **Cluedo** is, therefore, best played with a number of human and a few computer participants. *John Gilbert*

Publisher Leisure Genius **Price** £9.95
Memory 48K
★★★

Quackshot

SLITHERING snakes and clockwork yellow ducks are your enemies in **Quackshot**.

Your task is to keep everything quiet in the Acme Clockwork Toy Factory. But as you hear strange noises and start to investigate, you are pursued by giant ducks and green snakes and other wacky wind-ups. The only way to escape is to destroy



the clockworks with your stun gun and duckbuster bombs.

You have a time limit on each stage, collecting keys and bonuses to transport you to the next phase of your mission and add to your score.

You have to negotiate the maze of corridors, which are obstructed by toys or dead ends. There are 16 screens for you to pass.

The graphics are smooth and as basic as any other maze game. It is reasonably priced if you like this sort of run-of-the-mill game. *Norisah Fenn*

Publisher Creative Sparks
Price £2.50 **Memory** 48K
Joystick Kempston, Sinclair
★★★

The Covenant

ANY CONNECTION between **The Covenant,** biblical events and good games is totally coincidental.

You must guide your space ship around the caverns, getting out to pick up objects and pieces of covenant which, once fitted together, will save the world from destruction. There is, however, the little problem of the Thingies. They have a sting in their tails which will terminate you instantly.

To destroy the Thingies you must leave your craft, pick up some anaesthetic and hit one of the two creatures. It will then be disabled for a few seconds. Then jump back into the spacecraft and bounce on it to pick it up. Such complex action makes lengthy play impossible.

The Thingies are intelligent and attack as soon as you leave your craft, draining your energy. Getting to the



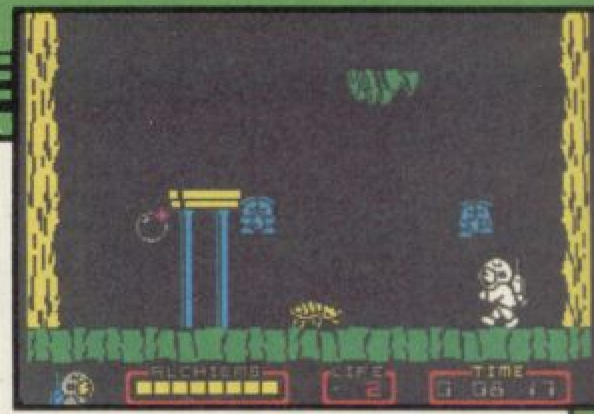
energiser is difficult and once there the Thingies continue their attack.

In the second section you must pass pipes which drip molten lava. There are more Thingies to kill, more covenant to pick up and more sections through which to pass.

Arcade wizards would find it difficult to complete 256 caverns, go through 67 passages and contend with ever-present aliens using just one life. *John Gilbert*

Publisher PSS **Price** £6.95
Memory 48K
Joystick Kempston, Sinclair, Cursor
★★

more software on page 24



Nodes of Yesod

LUNAR adventure awaits anyone brave enough to accompany the infamous Sloane Ranger, Charlemagne Fotheringham-Grunes, on his mission to save the earth.

Odin's **Nodes of Yesod** is startlingly similar in theme to Quicksilva's **Bugaboo** but there the similarity ends.

You play the part of the intrepid Charlie who has to search the caverns of the moon for a monolith, which scientists believe is used to transmit coded messages through space.



On docking, your best bet is to find a friendly mole who will be of considerable help later on in the game. Moles are able to gnaw through some cavern walls, opening up larger areas for exploration. For some unknown reason, Charlie keeps the mole in the helmet of his space suit.

Dropping through one of the many craters, Charlie descends to a world inhabited by many wonderful alien types. Fish swim quite happily in zero gravity, firebirds and walking limes stalk the cavern floors — all of which will send you reeling. Dancing teddy-bears decrease your energy, but the mole can be sent to kill them.

Dressed in a space suit, Charlie is able to somersault from platform to platform as he makes his way through the caverns. The graphic detail is excellent.

Eight alchiems — unidentifiable objects — must be picked up if you are to find the monolith which is cunningly hidden.

A grid at the bottom of the screen keeps count of alchiems collected, energy levels and has a real time clock. If your energy gets too low you may have to sit down for a rest.

One alien in a red pressure suit must be avoided at all costs — he cannot be killed. As soon as you have found an alchiem he will be along to steal it.

Control of movement when switching from Charlie to the mole is simple and animation is smooth — except when two bears land on the same spot, when they flicker wildly.

The game more than makes up for the reams of waffling prose, spelling mistakes and lack of story on the cassette inlay. What are Rhodendendrons anyway? Despite that, **Nodes of Yesod** is definitely worth adding to your library of games. *Clare Edgeley*

Publisher Odin **Price** £9.95
Memory 48K **Joystick** Kempston, cursor, Sinclair
★★★★

Go to Hell

BAD TASTE carried to extremes is the concept of the first release from Triple Six, an ominous name if ever there was one.

Hell is a 50 screen maze, garish and full of cute little animated scenes of torture. Heads explode in gouts of red as spikes crush them. Bodies are stretched on racks, decaying faces are sawn into pieces.

The walls are composed of the bodies of the damned, or fiery pits, and the whole vile picture is set against a background of sound which can best be described as a sinister squelching, like somebody walking in squeaky shoes over pieces of raw liver.

The game is difficult and addictive, but there are no great ideas and programming involved. Spiders pursue you with webs, and other nasties hurl missiles at you.



The quest involves finding seven giant crucifixes culminating in a friendly chat with Beelzebub. For all their horror, the graphics are very much based on the UDG format, with a certain amount of flicker.

Buy it for the sicko humour rather than the game, and you'll not be disappointed.

Chris Bourne

Publisher 666 **Price** £6.99
Memory 48K **Joystick** Sinclair, Kempston, cursor
★★★

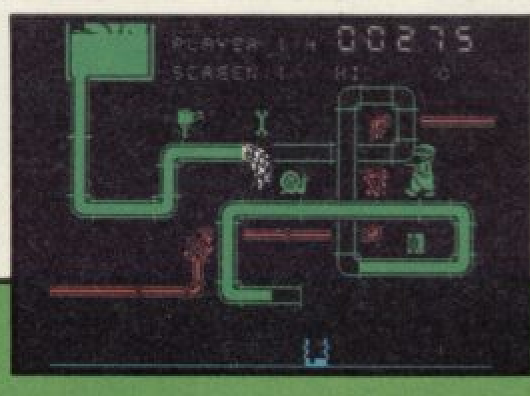
Super Pipeline II

THE TASK is hardly run of the mill and graphics hardly sophisticated in this drain of a game from Taskset.

Your objective is to keep the pipeline open. No holes or gaps must appear in it and it would be more than your job is worth if water escaped and did not run into the barrels below the pipe.

As foreman Fred you have two helpers who will hammer any hole closed. But first you must collect them and lead them to the leak. Obstacles include evil insects, intent on chewing you to death, and various power tools which have wills of their own.

Despite the awful graphics the player will also be disappointed with the playability of the game — worse than the original arcade version. The graphics could have been at least as colourful, even allowing for the Spectrum screen restrictions.



Super Pipeline II is like *Jaws II*, all packaging and no bite.

John Gilbert

Publisher Taskset **Price** £7.95
Memory 48K
★★★

more software on page 26

Tales of the Arabian Nights

"LORD of the silken bowstring," said Scheherazade, "I'm sick of telling stories. Let's play a computer game instead." And so the great Sultan plugged in his gold-plated Spectrum.

"Aha!" quoth the Sultan. "Tis a tale of the rogue Imrahil and his quest to rescue Anitra from the evil Saladin."

And so the mighty Sultan settled down and began to guide the pale, flickering Imrahil about the screen of his bejewelled Sony.

"See my lord," murmured Scheherazade, "here is the ship of Sinbad, full of gold. Each bag is marked with a letter, and the letters spell out the sigil ARABIAN. Collect the gold and enrich thyself with points beyond measure."

But the Sultan grew angry, for he found it most difficult to spell Arabian. There were three As in it, and which was which, and what was what, and why? Lives did he lose as the night progressed, jumping from deck to deck and mast to mast, avoiding the hazards of Sinbad's ship. And the couscous sat heavy on his bowels.

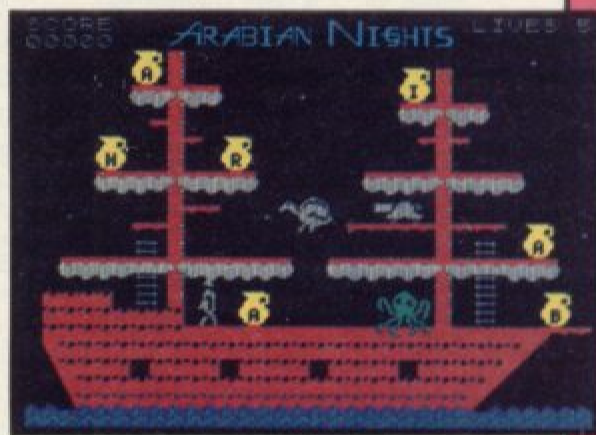
Then Scheherazade of the nimble wrist took the diamante joystick and showed her master how to negotiate the first screen, and then it was straight down the river by raft to the caverns of Al-Khemizd.

"More gold!" roared the Sultan, and straightway began collecting the bags again. Meanwhile Scheherazade tiptoed out to play much more exciting state-of-the-art stuff with her friends in the village, and was never called upon to serve the Sultan again.

Which teaches us, O children of the desert, that even the simplest of level and ladders games may provide a few hours of escape from the rigours of the harem.

Chris Bourne

Publisher Interceptor **Price** £5.50
Memory 48K **Joystick** Kempston
★★★★



Psychedelia

HEY MAN, this is really far out. It's so far out I can't see the point of it.

The latest craze from Llamasoft is called **Psychedelia**. The author describes it as a computer toy.

You could hardly call **Psychedelia** a game. All it does is create random, pretty, patterns which you can program and save onto tape. Pressing keys on the keyboard will have one of three effects. You can either change the characters which make up the patterns, change their colours or the overall flow of the patterns.

If you want to produce your own patterns the program presents you with one cursor block on the screen. You can change the block into one of the pre-defined character shapes, set the visual synthesiser to record mode and press the keys to control the direction of the whirls, lines, circles and diamonds.

Llamasoft has launched the product



into the wrong market. Instead of being on the shelves of high street shops it should be running advertising matter in their windows. The program does allow text to be run with the graphics, so the product would be ideal for visual advertising.

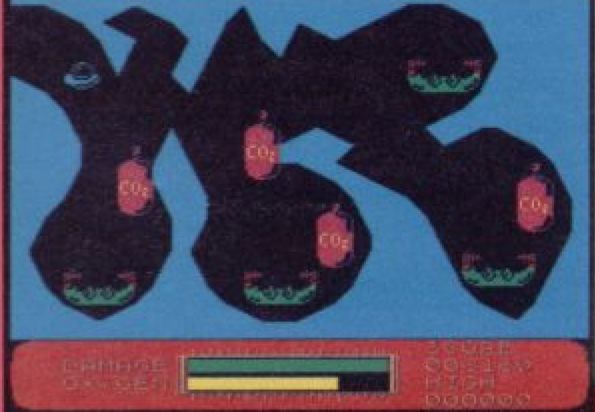
The light synthesiser is an interesting idea, probably generated because Jeff Minter of Llamasoft had run out of things to do with camels, goats and llamas. It is the sort of activity which could make you go blind — or mad. You would certainly be mad to buy it.

John Gilbert

Publisher Llamasoft **Price** £7.50
Memory 48K **Joystick** Kempston, Sinclair
★★

Frankenstein 2000

"PERFORM revolutionary micro-surgery during this fantasy journey



through the long lost monsters body. Deposit the secret formula from your especially equipped micro submarine in the bionic implants scattered throughout the body's organs."

Thus reads the ungrammatical blurb on the cassette inlay of **Frankenstein 2000.** Sounds familiar? Don't be fooled. This game bears as much resemblance to Quicksilva's **Fantastic Voyage** as it does to entertainment.

In the trachea your sub has to avoid the hopping frogs; in the lungs you do battle with cigarette packets. Lurking in the stomach are undigested fried eggs and greasy bacon. What a hoot.

Your rapidly diminishing oxygen supply can be replenished by a brief shoot 'em-up after every two organs, in which you fire at rampaging oxygen molecules. Damage to your craft can only be repaired by locating spanners.

The graphics are large, coloured and uninspired. Arcade nuts will find most screens a doddle, but the infantile humour will defeat them.

As a budget game it would be average. As it is, almost any other game at the same price is better value for money. **Fantastic Voyage** certainly is.

Bill Scolding

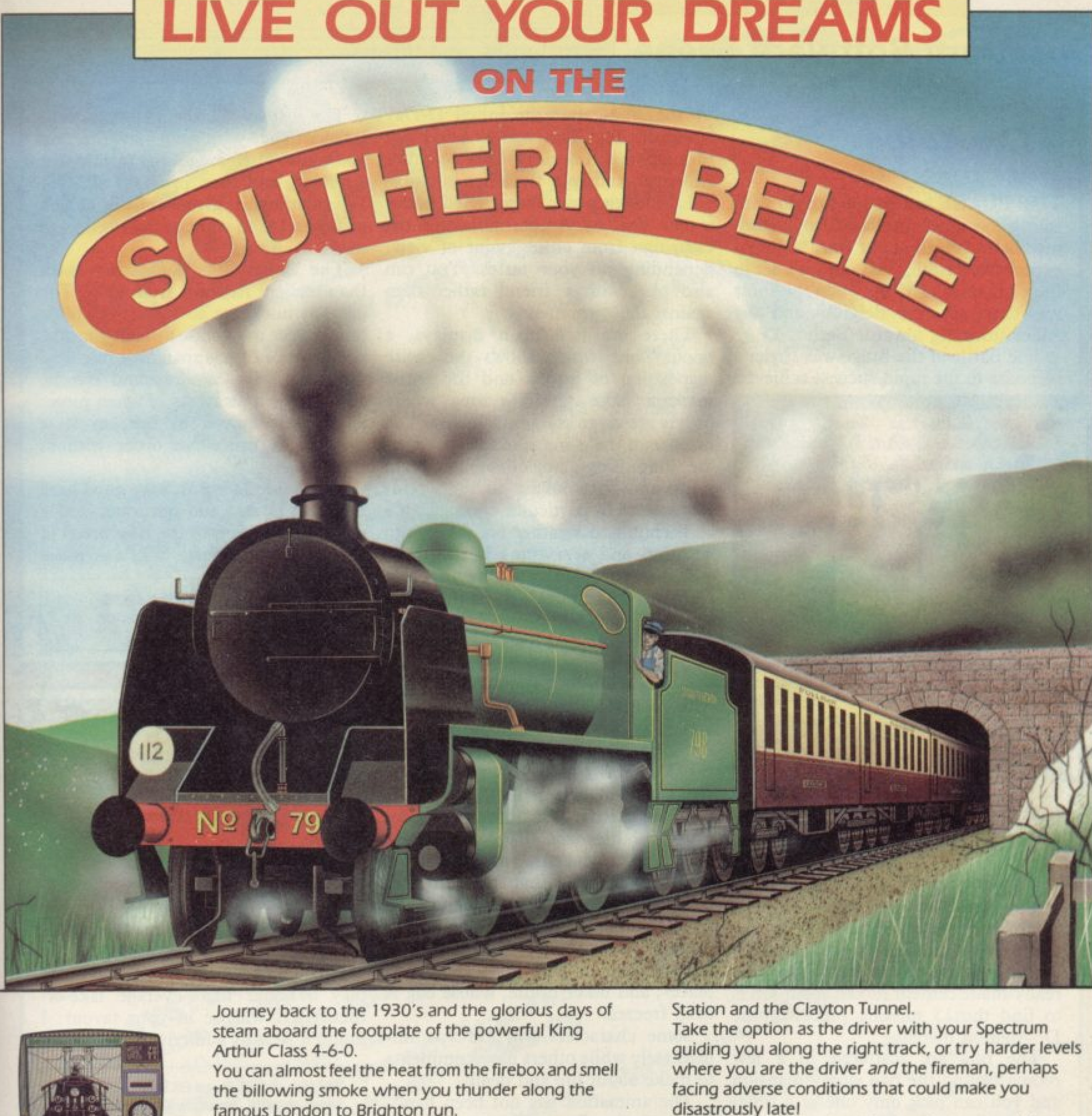
Publisher Icon **Price** £6.95
Memory 48K **Joystick** Kempston,
★★

more software on page 28

LIVE OUT YOUR DREAMS

ON THE

SOUTHERN BELLE







Journey back to the 1930's and the glorious days of steam aboard the footplate of the powerful King Arthur Class 4-6-0.

You can almost feel the heat from the firebox and smell the billowing smoke when you thunder along the famous London to Brighton run.

Using the footplate controls and gauges you will tow the Pullman carriages from Victoria to Brighton in 60 minutes. Any delays will ruin your timetable, so keep an eye on your stocks of water and coal – you can check the efficiency of your coal burn by the density of the smoke. Your present speed, time and the position of the next signal for guidance are also displayed.

Wipe the soot from your eyes and peer out of the cab to pick out the 24 stations as they rush by. Look out for other well known landmarks such as Battersea Power Station and the Clayton Tunnel.

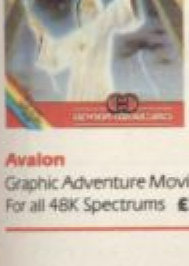
Take the option as the driver with your Spectrum guiding you along the right track, or try harder levels where you are the driver *and* the fireman, perhaps facing adverse conditions that could make you disastrously late!

Realistic controls such as the regulator controlling the flow of steam to the cylinders, the damper controlling air flow to the fire, vacuum brakes and the fire doors, plus authentic moving graphics and sound, make Southern Belle second only to the real experience.

You have steam up, there's a strict timetable, the Southern Belle is all yours.

Now that was the age of the train!

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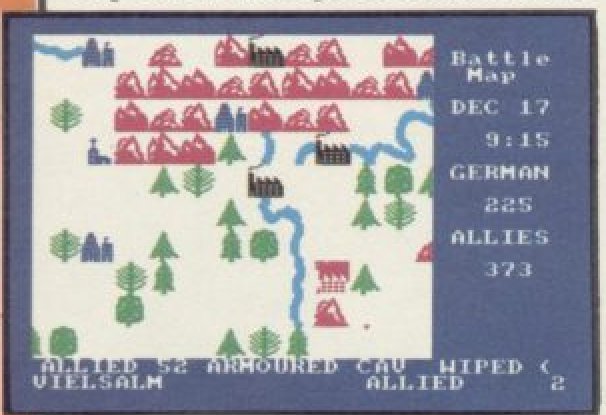
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The Bulge

THE BULGE has nothing to do with eating too much paella on your summer hols. It's all about war, as you'd expect from Lothlorien, and it's set in the Christmas of 1944, when the snow was deep all over Belgium and the Allies storming towards Berlin.

The Battle of the Bulge was Hitler's response to the rapid success achieved by the allies after the initial D-Day landings. The plan was to blitzkrieg through the American lines, capture Antwerp, and split the allies in two.



Lothlorien's game, marketed under a new deal by Argus, simulates the campaign from either point of view, depending on your tastes. You can also play with a friend rather than against the computer.

There are two main displays, a 'global' one which shows the entire disposition of forces, and the battle map, a large scrolling area where orders are given and units moved. The essence of the game is to set appropriate long range objectives for main units and then adjust to send reinforcements to particular areas.

Terrain and weather are taken into account, and everything is real-time, which leaves room for little error. The Germans must punch through as fast as they can, while the allies must bolster the tattered lines.

The display is clear, if not particularly artistic, with UDG-style terrain and units. Movement is by positioning a cursor, and then pressing SPACE. Information is given on the unit's status and then you can issue orders to move it.

The Bulge begs comparison with the excellent **Arnhem** from CCS. The game is not quite so friendly to play, but gives as good a feel for the problems of the campaign. It might be improved with better sound effects, and clearer indications of when pieces have been moved or not, as it is possible to cancel an order without realising it.

That said, **The Bulge** is a good hard fight. It is fast and accurate, and a welcome addition to the new breed of computer wargames. *Chris Bourne*

Publisher Lothlorien **Price** £9.99
Memory 48K **Joystick** Kempston
★★★★

Rocky Horror Show

LET'S DO the Time Warp again and enter the mansion of Dr Frank 'n' Furter.

So here's the plot. Your beloved Janet, or Brad — depending on whether you're male, female, or just don't care — has been pushed into the Medusa machine, the evil doctor's ready-made cement mixer. Your job is to find the 15 missing pieces of the De-Medusa machine.

The bits are scattered in a few rooms around the two storey mansion and you can pick only one at a time. You then carry it onto the stage and fit it into the machine's flashing frame.

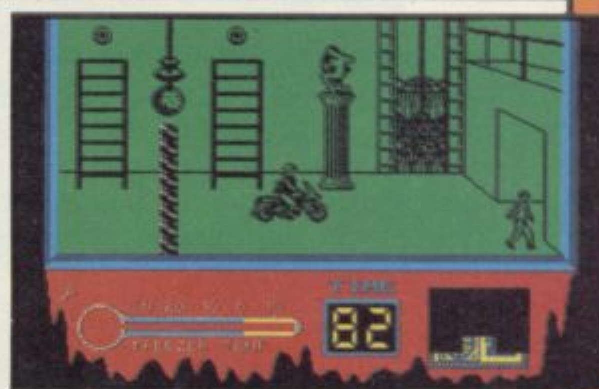
The rooms contain laser beams, yin and yang symbols, magic mushrooms and hypodermic syringes, so be careful. You will also have weird characters with which to contend.

There's Riff Raff, the manic depressive butler who serves electrifying experiences. Magenta will take off all your clothes. Is that the ultimate computer experience or a cheap thrill?

The other characters include a groupie, Columbia; Rocky Horror, a Furter creation who appears in odd places; and biker Eddie, whose bag is deep freezes.

Some characters will kill you immediately while others have comments to make about life and death.

The animation has not been handled as well as it could have been. If several characters are moving on-



screen the action is slowed down.

If you enjoyed the film and want to play a better than average take-off then CRL will be in your favour. I found it weirdly addictive. *John Gilbert*

Publisher CRL **Price** £8.95
Memory 48K **Joystick** Kempston, Protek, Sinclair
★★★

Saimazoom

PROFESSOR Indiana Smith is no relation of the famous Spielberg archaeologist but he does get into the same sort of trouble.

His exploits are featured in a trilogy of games under the title **Saimazoom**. He starts his adventures in a jungle, probably 'somewhere in Africa', where he is after some rare and exotic specimens. Some archaeologist! He does not know what he is after or what his finds are until he gets them back to base camp and he has no map.

Luckily, he can pick up guns, axes and canoes scattered around the place. There are 100 square screens, or miles, to be travelled within the game and the journey involves river crossings, monster attacks, and even a



spot of GBH on local jungle shrines.

You can get to the shrines using keys which you have found. Just insert one into a lock and you will be teleported to another location.

The unlikely scenario, ease of play and wimp monsters make the game suitable only for those who have not touched a computer or laid eyes on an arcade game. *John Gilbert*

Publisher Silversoft **Price** £7.95
Memory 48K **Joystick** Kempston, Sinclair
★★★

MicroAPL

MICROAPL is a powerful subset of APL, a language developed in the 1960s but which, because of its specialised symbols and use of memory, has only recently been translated to microcomputers.

The language is similar to Forth. It allows the user to define functions which act as stand-alone programs or which can be used in other functions. **MicroAPL** is, however, easier to use than Forth. You can create variables in a similar way to SuperBasic and without the hinderance of a stack structure.

Arrays are not allowed within the language but you do not need them. One variable can contain a matrix, or list, of strings or numbers, each separated by a space. For instance

A is 1 2 3 4

would put those values into variable A. To access just one of the numbers you have to use a language construct similar to the one which selects a character or number from a SuperBasic string or array. For instance,

A ‹1›

would print '1' on the screen as it is the first number in the A variable created above.

It is possible to automatically set up ranges of numbers within variables using an index command.

It is also possible to manipulate those numbers using **MicroAPL**'s extraordinarily powerful numeric operators.

If you want to perform an operation on a whole range of numbers it can be done with just one command.

A is 10+5 7 9 12

will add 10, the number before the + operator to 5, 7, 9 and 12 and so they become 15, 17, 19, 22. Those matrix operations are performed at great speed even when hundreds of values are involved.

The package is also equipped with graphics and sound commands, although you may have to set up your own functions to make them easier to handle.

MicroAPL is an impressive package and a pleasure to use. It is ideal mainy for use in education and research which requires the solution of complex formulae but it could be used in business to calculate profits and tax.

MicroAPL has done a fine conversion job for the QL. More power to its programming language.

John Gilbert

Publisher MicroAPL, Unit 1F, Nine Elms Industrial Estate, 87 Kirtling Street, London, SW8 5BP
Price £99.95
★★★★★

QC Compiler

THE **QC Compiler** from GST does not provide a full implementation but a hacked-down version called Rat C with the addition of logical, unary and assignment operators and comma expressions.

Two microdrive cartridges are included within the package. The first contains the compiler, an assembler, the Sinclair Linker, a SuperBasic program to boot the compiler and a clone. The second cartridge includes the library routines, an I/O header file and an example of C source file.

One serious omission from the package is a screen editor. The instruction booklet states that you will have to get one from another source, such as Tony Tebby's **QL Toolkit**.

The compilation process is not as friendly as it could be. After typing the C source code listing into a file editor you must save it and load it back into the C compiler which generates 68000 source from the C listing.

You must then save that source and load it into an assembler — any assembler — which will complete the translation into 68000 code.

There are no grumbles about the documentation. The company has done its usual better-than-average job. The manual is comprehensive but, for some odd reason, includes more than it should. A few of the example programs contain a C instruction which cannot be used within the Rat C environment.

The package is disappointing. GST is a company which is highly regarded by other manufacturers, including Sinclair Research, and it should know that a good user interface which helps beginner and expert alike is important. The core of the product has been well put together but a little more time could have been spent on window dressing.

John Gilbert

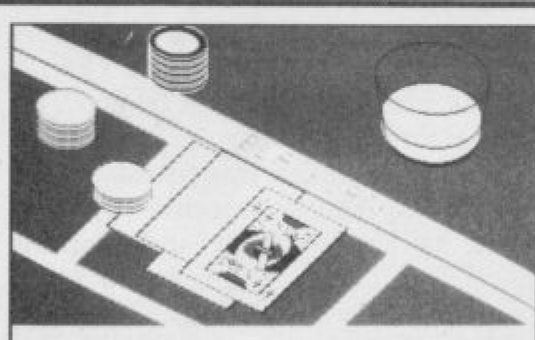
Publisher GST
Price £59.95
★★★

Blackjack

CARRYING on the tradition of 'bring out the rubbish first and promise to bring out the good stuff later', Quest has launched **Blackjack**.

The evergreen game, probably that colour because of the mould it has attracted as it festered in the vaults of software companies, is a simulation of casino Blackjack in which you and the banker battle it out to get the highest value hand or 21 — a Blackjack. That is the claim but it is just not true.

There are certain aspects of the game which do not tally with our



expert understanding of it. For instance, when the values of your hand and that of the computer are equal the game gives you your bet back. In the version of the game which we know — and love — you lose your money unless you have an outright win.

The only selling point for **Blackjack** is the better than average graphics. They include a display of the cards and the number of chips you have on the table. The LOADing screen, put up two minutes into the game load, shows cards and a straight whisky.

You will probably need the whisky if you have just parted with the £20 needed to purchase the game. There is no logical reason for putting the price so high. Quest is taking no gamble.

John Gilbert

Publisher Quest
Price £19.95
★

more QL software on page 32

MonQL

WE HAVE received assemblers by the bucketful but we have been waiting for a good monitor/disassembler to arrive. HiSoft has, at last, plugged the gap in the market with **MonQL**, by Andrew Pennel.

Once called from microdrive one, using a boot routine, it can either be loaded into what HiSoft regards as the usual space for machine code programs or into the resident procedure area. In most cases the latter is more protected than the former.

It is possible to drop out of the monitor and back into SuperBasic by using CTRL+Q and from there to re-enter the program by typing MONQL as a procedure named.

When it has been loaded **MonQL** displays information about how it was entered and gives the Job ID which is usually 0 when execution starts from SuperBasic.

A front panel window is set up near the middle of the screen. It is split into two sections. The first contains information on the state of some 68008 registers. The values contained within the Program Counter and Status register are shown.

The flags which have been set within the Status Register are also displayed. As usual T means Trace bit set, U means that the processor is in User mode and S means that Supervisor mode is in operation.

Control commands are entered using keywords, in a similar way to the Spectrum. For instance, J means Job Control and Display while Q invokes a Quick Disassembly.

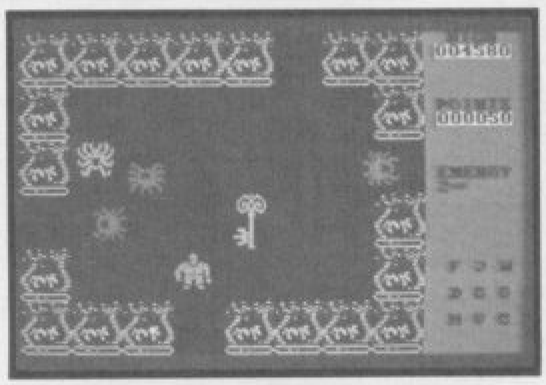
Other monitor functions include memory block copy, set Memory Pointer, register modify, base conversion, insert breakpoints, and a series of search facilities which can be done using byte, word, or long words. The function keys have also been set up to change the size and position of the front panel window. One criticism is that the sizes have been set by the author. You cannot use cursors to extend the window.

MonQL continues the high standard which we have come to expect from HiSoft, but the same cannot be said about the documentation. The manual gives brief details of monitor operations and multi-tasking but could have been expanded to include more examples for beginners.

Despite that **MonQL** is a useful product and one of the best disassemblers on the market. *John Gilbert*

Publisher HiSoft
Price £19.95
★★★★

Land of Havoc



THE BOX looks great. A lizard man fires a gun at a giant scorpion. Inside, there are nine glossy postcards with maps on them. Even the instruction booklet looks like it was done by Ultimate. But no . . . instead we've got a maze game from Microdeal.

If that sounds cruel let this be fair warning: we intend to be nasty about QL software until the quality catches up with the price. **Land of Havoc** is a gigantic game, to be sure — 2000 screens — but the graphics do not exactly stretch the machine.

You have to run around a maze collecting various objects on a lengthy quest. The first maze has nine sections, including a desert, village, forest and graveyard. To begin with you must seek a book in the village, then you will be directed to other areas for more objects. The postcards fit together to form a large map, changed each game. After the first stage, you move underground, where the maps cannot help you.

The graphics are very large and chunky, a sort of magnified **Sabre Wulf** but wholly lacking in the riotous colour and variety of foes of that classic maze game.

It is expensive, which reflects the cost of overheads against a small QL market, but such excuses mean little to the customer. If you require arcade action on your QL, then buy it by all means, but don't expect miracles of programming. *Chris Bourne*

Publisher Microdeal
Price £19.95 **Joyskick**
★★★

QL Gardener

PLAN YOUR English country garden with the latest really useful gem from Sinclair Research.

To be fair the program provides extensive plant and tree databases, but how many people in the still small QL user base also have green fingers and are willing to buy a piece of software when books do just as well? At least you can easily take a book into the garden or to the horticultural centre.

The master program is a database controller into which you can load one of the plant libraries supplied with the package or one you have ordered from an address given in the instructions.

The plant libraries can be accessed to perform a variety of functions. They can be used in general garden design, to choose specific types of plant or for teaching and learning purposes. The two libraries included in the package are Bushes and Trees, and Garden Flowers. Each is capable of storing 600 plant names and details.

The catagorisation of plants includes type, hardiness, size, growth speed, foliage, scent and soil conditions. You may want to find a plant which flowers in summer, will flourish in rocky ground and has a purple bloom. The program provides a series of menus which, hopefully, will lead to several plants of the variety you require.

Although the instruction booklet is well written it treats the reader as an imbecile. A large amount of space is filled with the technicalities of using the QL. Much of the information is repeated within the program.

It is hard to understand why Sinclair, which boasts of the power of the QL, has launched a product which could have run equally well on an 8-bit micro. *John Gilbert*

Publisher Sinclair Research
Price £24.95
★★

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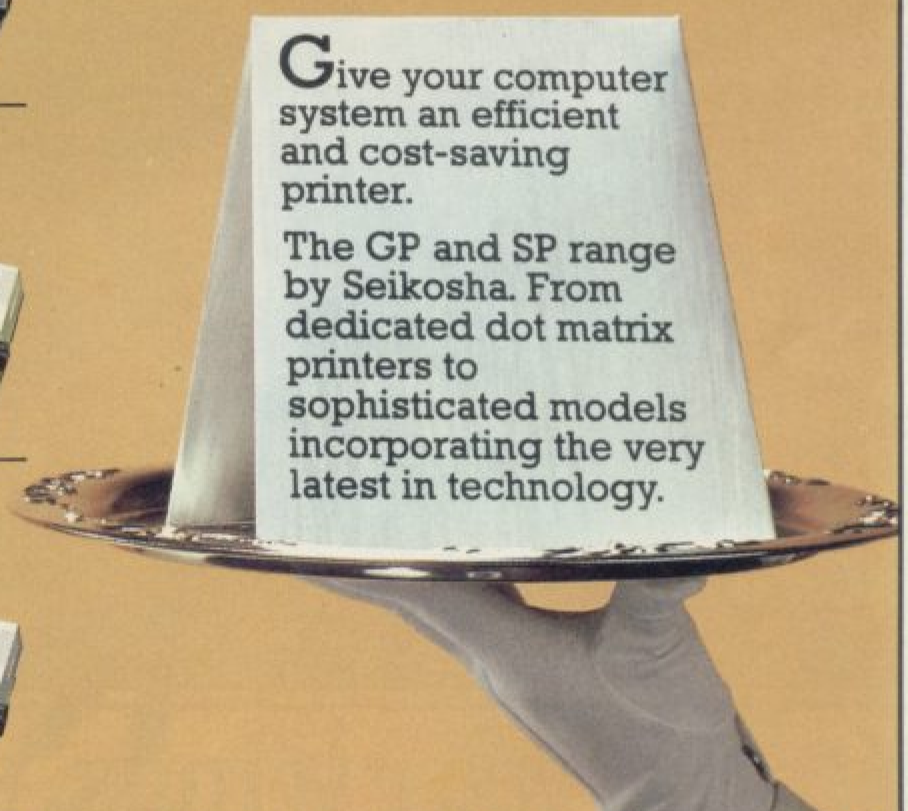
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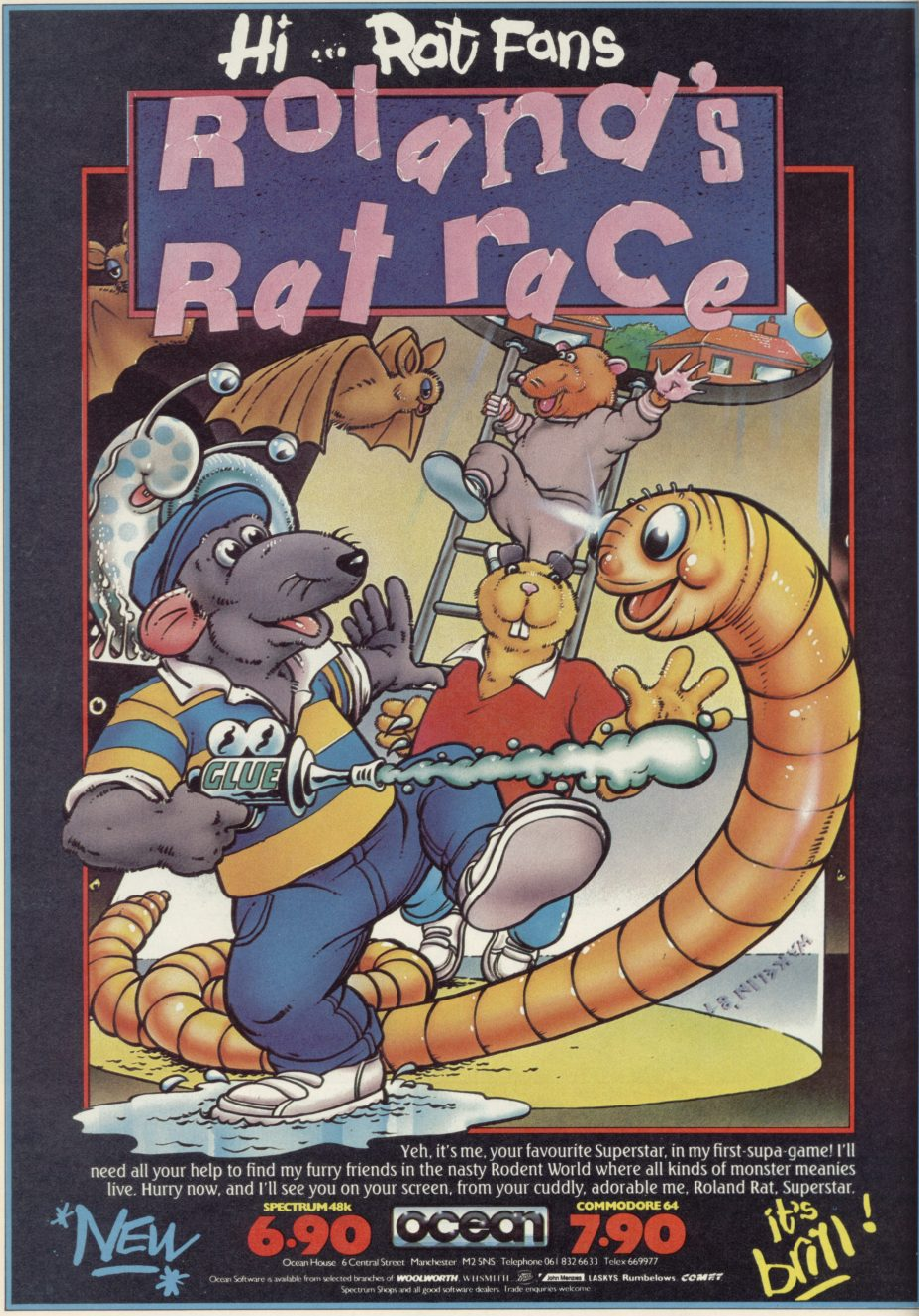




SPECTRUM 48K £7.95

Gremlin Graphics

Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS. Tel: (0742) 753423


Hi ... Rat Fans
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Spectrum Shops and all good software dealers. Trade enquiries welcome.

Insider information

POTENTIAL disc users with a QL are about to be deluged with a range of interfaces for their machines. At least five new ones are planned between now and September.

The first of those is the Insider, marketed by Silicon Express. Having looked at the Quest and Micro-Peripheral systems, it is a refreshing change.

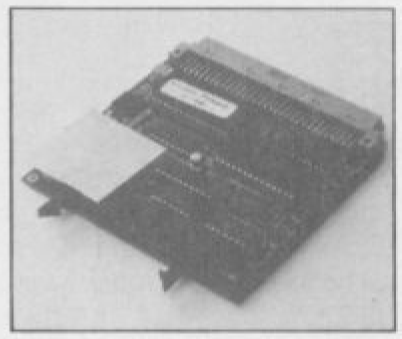
It works faultlessly with an odd collection of 3½ and 5¼in, 40- and 80- track drives — it can also handle 3in drives — and, as it uses the device name FLP, you can swop discs between it and a CST system.

The Insider is, in many respects, a budget system. The interface PCB fits into the port on the left of the computer leaving the disc connector sticking out. The advantage is that it does not add much to the overall length of the machine but, unlike the CST interface, there is no plastic cover so dust can get in.

One good feature of the interface is that when you press F1 or F2 after resetting it looks to the disc for a BOOT file and, if there is no disc present, it looks at MDV1. Unfortunately, it forgets to turn the disc drive motor off when that occurs and you have to put a disc in to stop it.

The ROM in the interface adds only one extra command to SuperBasic, FLP_USE. With that you can enter FLP_USE MDV and the disc drives will respond to the device name MDV.

The only problem you might have is when running the version 1.00 Psion software from a single drive as the programs look for a second drive. Silicon Express has included a SuperBasic program listing in the instructions which converts all occurances of MDV2 to MDV1, plus the instruction to go away for two to three hours while it runs.



For users with the Tony Tebby Toolkit the interface has all the machine level hooks to implement a sector read/write, — Put and Get etc — plus all the other filing. As with many other disc interfaces the ROM was written by Tony Tebby.

The system is plain, simple and likeable. Unfortunately, in the last month the price of £113.85 has been overshadowed by price reductions of other interfaces. Only the combined interface/drive package, £249.00, remains competitive.

Silicon Express Ltd, FREEPOST, Rothley, Leicester LE7 7QZ. Tel: 0533-374917.

Board with all the memories

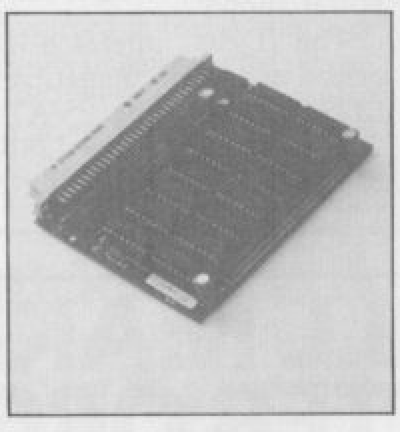
QL Plus has increased its range of add-on memory for the QL to include a new 512K board. Like its other boards, 64K, 128K and 256K, the 512K board fits completely inside the QL and takes its power from the computer.

As with all extra memory, programs which use it, such as the Psion suite, run much faster. That is due to the processor being able to use the memory while the TV picture is being sent out.

Unlike QL Plus's other boards, the 512K has two problems. They are likely to affect any 512K board and are the fault of the QL rather than the board.

The board needs a fair amount of power to drive it and the power available from the QL is limited. If your power supply is low, fitting the board can degrade the display. Of the two QLs tried, one running on a TV suffered degradation while the other, running on a monitor, was unaffected. A two-way adaptor will be needed if you want to plug in both RAM and, for example, a disc interface.

The other problem is in the way QDOS handles ex-



tra memory. For some unknown reason it treats 512K add-ons differently from other sizes. That is more a problem for software writers but one victim is **QL Chess**, which will not run with the board fitted.

If you need the memory then the QL Plus board at £316.25 is the cheapest at the moment. Its other boards, 64K — £86.25, 128K — £132.25 and 256K — £172.50 are also worth considering.

QL Plus will shortly be bringing out a second version of its 256K board which will have a ROM on the board. The ROM will contain a large portion of the Tony Tebby Toolkit including a RAM disc facility and will be only £10.00-£15.00 more expensive.

For further information contact PCML Ltd, Royal Mills, Esher, Surrey. Tel: 0372-67282.

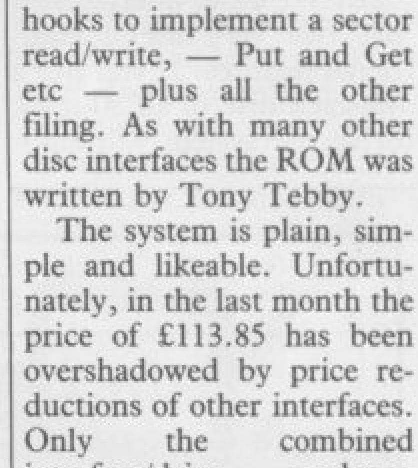
The return of Centronics

SMC has recently joined the ranks of QL add-on suppliers and its first product is that old faithful, the RS232 to Centronics converter.

As with nearly all the others, it fits between the SER1 port and a Centronics printer and operates at the QL default setting of 9600 baud. As the baud rate is not switchable it could be a problem if you want to use SER2 at the same time, for example with a modem.

Despite having the advantage of being guaranteed for 12 months, the price of £39.95 is well above that charged for the same sort of product from other companies — so shop around before buying.

SMC Supplies, 11 Western Parade, Great North Road, Barnet, Hertfordshire EN5 1AD. Tel: 01-441-1282.



more hardware on page 38

Delta in a sea of discs

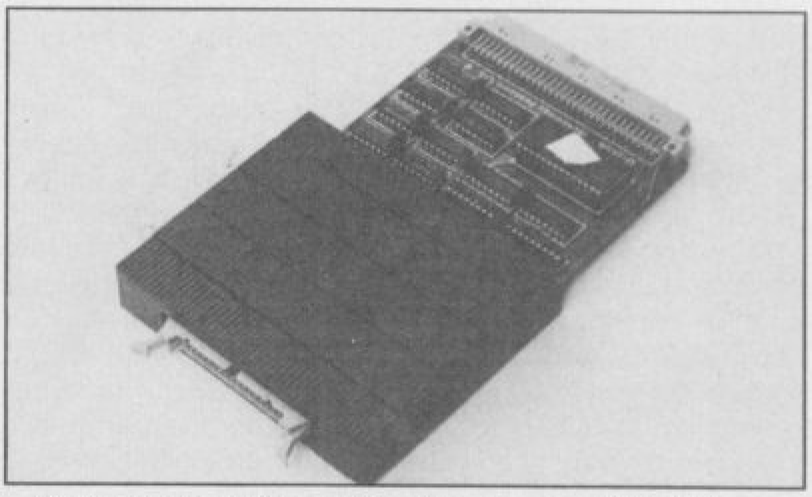
TECHNOLOGY Research, which is well known to Spectrum users for its popular Beta disc interface, has now turned its attention to the QL and released the Delta interface. That looks to be as popular; it has a well thought out disc interface and parallel printer port, RAM disc software built in and space onboard for up to 128K extra memory.

Like most other disc interfaces it is capable of supporting 3in, 3½in and 5¼in drives in either 40- or 80-track format. As it uses the FLP device name, discs from other systems, such as CST and Silicon Express, can be used with it.

Unlike other interfaces, it has two very useful additional features. If you put a 40-track disc in an 80-track drive the system will automatically double step the head so that you can read and write to it. If you have a double-sided drive there is the facility to force the system to Format a disc as single-sided. These features mean that, within reason, you can swop discs between different systems and drives.

As with the Silicon Express interface, Delta adds FLP_USE to SuperBasic plus all the various machine level hooks — the software was written by Tony Tebby. There is also RAM_USE for the RAM discs. Up to eight separate RAM discs can be set up.

Like the Silicon Express, it first looks to the disc for a boot program, then the microdrive. But unlike Silicon Express it remembers to turn the drive off.

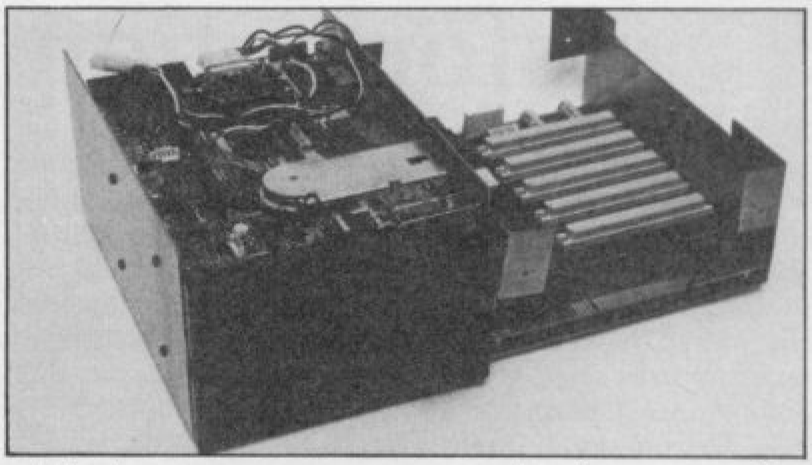


The unit is quite small, not much bigger than the CST interface, and is housed in a plastic cover. The onboard memory takes its power from the QL and does not require an extra power supply.

The Delta interface is priced at a very competitive £129.50 including VAT; with 64K £199.50 or 128K £249.50. It does not have the range of Toolkit commands that the CST interface has but those can be purchased separately — members of IQLUG can get them for only £1.00. It is good value and could knock CST from the top spot.

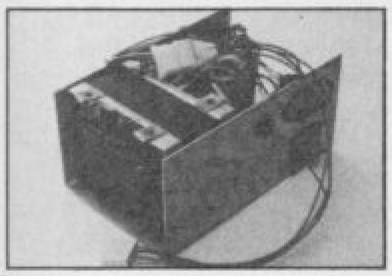
Technology Research Ltd, Unit 18, Central Trading Estate, Staines, Middlesex TW18 4XE. Tel: 0784-63547.

Disc system with mother



WITH the recent flood of disc interfaces for the Spectrum the Gordon Microframe has been largely overlooked. Although at £149.50 inclusive it is the most expensive it does have more potential than the others and can be built up into a very comprehensive system.

The Microframe is a disc-based motherboard system with a range of plug-in cards. A number of cards are under development at the moment, ranging from a simple Centronics interface through A to D, D to A, RS232 — for use with a modem — to I/O cards suitable for robotics.



The disc interface software is held on disc and booted into 16K of onboard RAM. That RAM is paged when a syntax error occurs. That means that not only is the DOS easily changeable but also that you can extend the Spectrum Basic; for example, the I/O boards can be driven using a Logo-like language.

As a disc system it is old fashioned in that it only uses single density. That, typically, gives 98K for storage on a 40 track, single-sided drive, and up to four drives can be used.

All the necessary commands are available: Load, Save and Verify for Basic, Code and Data plus Format and Erase. Open and Close are soon to be added. As it does not take up any of the Spectrum memory, even for a buffer, transferring software to disc is relatively easy. Gordon expects to release commercial software on the system soon.

The motherboard has been well thought out and it is quite straightforward to add your own boards.

The manual is comprehensive and gives details of all the relevant pin outs plus a description of what each one is used for. There are example programs, with some simple ones on disc, including one showing how to extend the Basic.

Although the board can be powered from the Spectrum Gordon does not recommend it as the tolerances are tight. It is designed to be powered from disc drives and, if those need power, Gordon supplies a supply for £63.25 inc.

The system is expensive, as you are paying for facilities that you are unlikely to use. In education, however, those facilities would be used to the full.

Gordon Microframe Ltd, 3 Callendar Road, Heathfield Industrial Estate, Ayr, Scotland KA8 9DJ. Tel: 0292-280467

Doffing caps at keyboard

THE DK'tronics keyboard has undergone many design changes since it was first introduced for the ZX-81, but it has always retained stuck-on legends. DK'tronics has now relented, and printed keycaps are available as an optional extra for the Spectrum keyboard.

The caps are printed in one colour, black, although the caps themselves are grey for the main keyboard, and red for the numeric pad.

Fitting the caps is simply a case of pulling the old ones off and pressing the new ones on. Instructions are not included, which would have been useful as you could damage something by being heavy handed.

For only £6.00 inclusive the caps are good value if you own a DK'tronics keyboard. If not, they could tip the scales in its favour if you are about to buy.

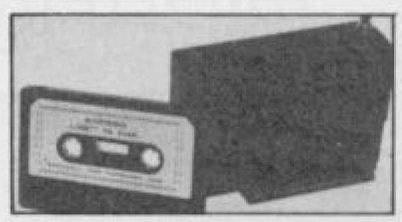
Three-colour printed caps might have been preferable, even at a few pounds more, but it is a step in the right direction.

DK'tronics Ltd, Unit 6, Shirehill Industrial Estate, Saffron Walden, Essex CB11 3AQ. Tel: 0799-26350.



Button-down transfers

INTERFACE III is a combined hardware and software package which allows you to transfer a program.



Once the program is loaded a button on the interface is pressed and a special copy is then put out to tape. After resetting, the interface software is loaded and the copy reloaded.

Interface III priced at £39.95 is awkward to use, requiring a lot of loading, saving and resetting.

Micro Centre, Bridge Street, Evesham, Worcestershire. Tel: 0386-49641.

Rock-bottom 32K upgrades

ALTHOUGH Sinclair is no longer building 16K Spectrums, some shops still have few left in stock and are selling them at bargain prices, in some cases for as little as £69.95. Upgrade prices are also coming down so if you are prepared for a little DIY you could end up with new 48K Spectrum for only £89.95.

The cheapest upgrade we have found is the Citadel 32K memory expansion, £20.00 to readers of *Sinclair User*, £24.00 to everyone else, including VAT and p&p. It has an advantage in that it uses 64K chips, rather than 32K, so that if you buy the TV Services of Cambridge system, you get two 32K pages of memory.

First catch a 16K Spectrum, then contact Citadel Products Ltd, 50 High Street, Edgware, Middlesex HA8 7EP. Tel: 01-951 1848.

more hardware on page 40

Transformation



TRANSFORM is considered by many to have produced the Rolls Royce of the add-on keyboards for the Spectrum.

While other keyboard companies have reduced prices, or even stopped producing since the launch of the Spectrum Plus, Transform has shrugged it aside, improved its keyboard, and increased the price to £79.95.

The improvements are the inclusion of four shifted cursor keys and an additional Caps Shift to the right of the bottom row of keys, matching the one on the left. The numeric pad has been altered to include a Full Stop and an additional Enter key. The old single key functions on the main keyboard are retained.

Inside, the additional interface required by some Spectrum Issue 3 users is fitted as standard. The power supply now has to be connected to the keyboard, a lead then plugs into the back of the Spectrum. The redesign, and the metal case, results in the keyboard weighing over 3kg even before the Spectrum is fitted, a veritable heavyweight.

The Transform is definitely for the serious user; the key switches alone cost the manufacturer more than the Spectrum Plus upgrade, and it is the only keyboard with three-colour key caps. Transform might not sell many keyboards at that price but there are times when only the best will do.

Transform Ltd, 24 West Oak, Beckenham, Kent BR3 2EZ. Tel: 01-658 6350.

Slow moving joystick device

THE NIDD Valley Slomo was a good idea, as was the Kempston joystick standard. DK'tronics has brought out the Games Player, a combined slow motion/ Kempston compatible joystick interface.

The Kempston standard is available on most popular games and the ability to slow down a game to a manageable speed is a boon to finger-bruised alien zappers.

The interface has a joystick socket, speed control and slow motion on/off switch on the top. Unlike Slomo you can not freeze the action completely but you can slow it down more than enough for most needs. At £14.95 it is good value.

Meanwhile Nidd Valley has stated that if their UK Patent application is successful slow motion peripherals will only be available from them. The ensuing wrangle could be interesting.

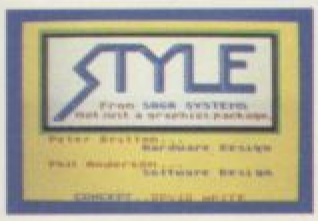
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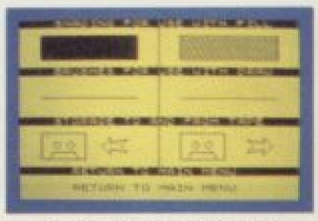




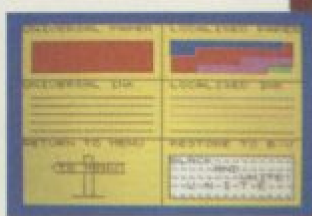
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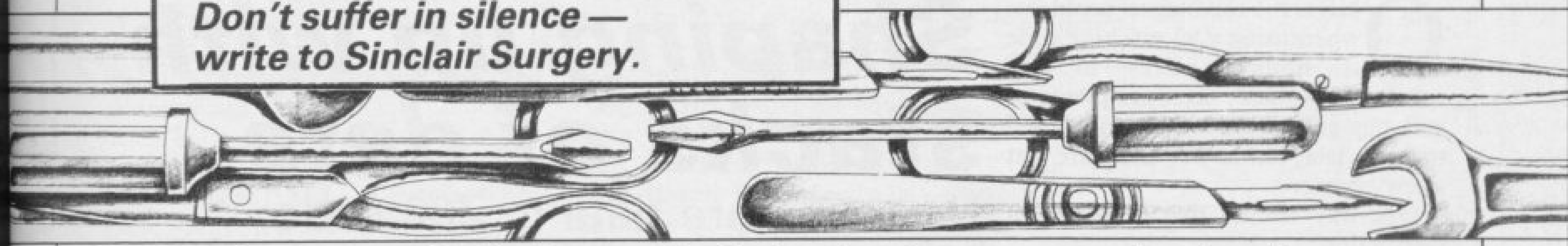
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Spare slot required

I WOULD like to buy a Hantrex 12in high resolution, green screen, composite video monitor. My present system consists of Spectrum, Wafadrive, Kempston Centronics Interface E and a Shinwa CP80 Printer. How can I connect a monitor to the edge connector when all edge connectors are occupied?

I believe that some change has to be made to the Spectrum to take the monitor.

A Richards, Taunton, Somerset

● *You need a two-way edge connector to give you a spare slot — the Currah Microslot from DK'tronics (0799 26350) priced £7.95 would be suitable — and a monitor lead. Transform (01-658 6350) can supply one for £11.50.*

Spectrum Plus minus Guide

I HAVE recently bought a Spectrum Plus but I am disappointed with the new style User Guide. Could you recommend a good book for the Spectrum that would help me with advanced Basic programming and which goes into assembly language and machine code, or is there anywhere that sells the original *Spectrum User Guide* separately?

Sam Clifford, Ivybridge, Devon

● *The original manual can be obtained from CPC, 194-200, North Road, Preston, Lancs — £2.81 — the introduction booklet is 88 pence. Unfortunately they have a minimum charge of £5.00 plus £3.25 handling plus VAT — £9.49.*

You could try Spectrum Machine Language for the Absolute Beginner, *Melbourne House, £6.95.*

Look before you leap

PLEASE advise me on what to look for in a good modem; the facilities and interfaces they require and the advantages and disadvantages of those systems.

Anil Malhotra, Billericay, Essex

● *You seem to be going about this in the wrong way. First you should decide what you want to do with a modem and then you should start looking at hardware. Otherwise you will end up paying for facilities you will never use.*

Dead flesh revitalised

I HAVE been considering upgrading my Spectrum's rubber keyboard to a proper keyboard. Are there any upgrade keyboards available with do not use the Spectrum's old keyboard matrix? Is it possible to buy a power supply separately and at what price?

Brenden Gorman, County Down, Northern Ireland

● *None of the full-sized keyboards for the Spectrum use the original membrane. Power supplies can be obtained from TV Services of Cambridge, Frenches Road, Cambridge or CPC, 194-200, North Road, Preston, Lancashire.*

48 into 16 won't go?

I HAVE a Sinclair 16K Spectrum. The serial number is 001-239113, which I assume is an Issue 1.

Am I able to obtain an internally fitted upgrade to 48K? From where? Most advertisements state Issues 2 or 3 only.

D T Brooks, Park Gate, Southampton

● *If it is an Issue 1 Spectrum you will be lucky to find an internal memory upgrade for it. The serial number is not a good indication. Look in the back at the edge connector; if there are chips close to the edge connector then it is a 2 or 3.*

Head needs examining

CAN YOU tell me if it is possible to print out alongside a microdrive CATalogue, information on whether a program is Basic, CODE, or DATA?

J R Mackaill, Scunthorpe, South Humberside

● *In order to get that information you have to look at the file header on the microdrive cartridge.* Master your ZX Microdrive *by Andy Pennell from Sunshine Publications — £6.95 — contains a suitable program.*

Spectrum's icy blasts

I RECENTLY had my Spectrum Plus returned from Sinclair after a replacement keyboard was fitted and now find that over-heating problems occur.

Programs crash for no apparent reason, the screen display occasionally becomes distorted and even **Scrabble** makes up words that it will not accept later.

Those problems disappear after a blast of cold air from a hair-dryer, only to return 20 minutes later. What can be done about it?

G Twidale, Scunthorpe, South Humberside

● *If it does not work, send it back with a covering letter outlining the problems. It can only get worse.*

Address unknown

I AM building a general purpose I/O port for my Spectrum and am puzzled by the I/O signals produced. The manual states that only the first five address lines are used by the Spectrum, and three more — $A_5 \rightarrow A_7$ — can be used for other external devices.

I have checked the status of those last three lines and it appears that A_6 and A_7 are constantly active, while A_5 remains inactive until the keyboard is used.

Philip Clegg, Camberley, Surrey

● *The* Spectrum Hardware Manual *by Adrian Dickens, £5.95 from Melbourne House, shows you how to add a Z80 P10 to the Spectrum and gives details of which lines are free.*

One size fits some

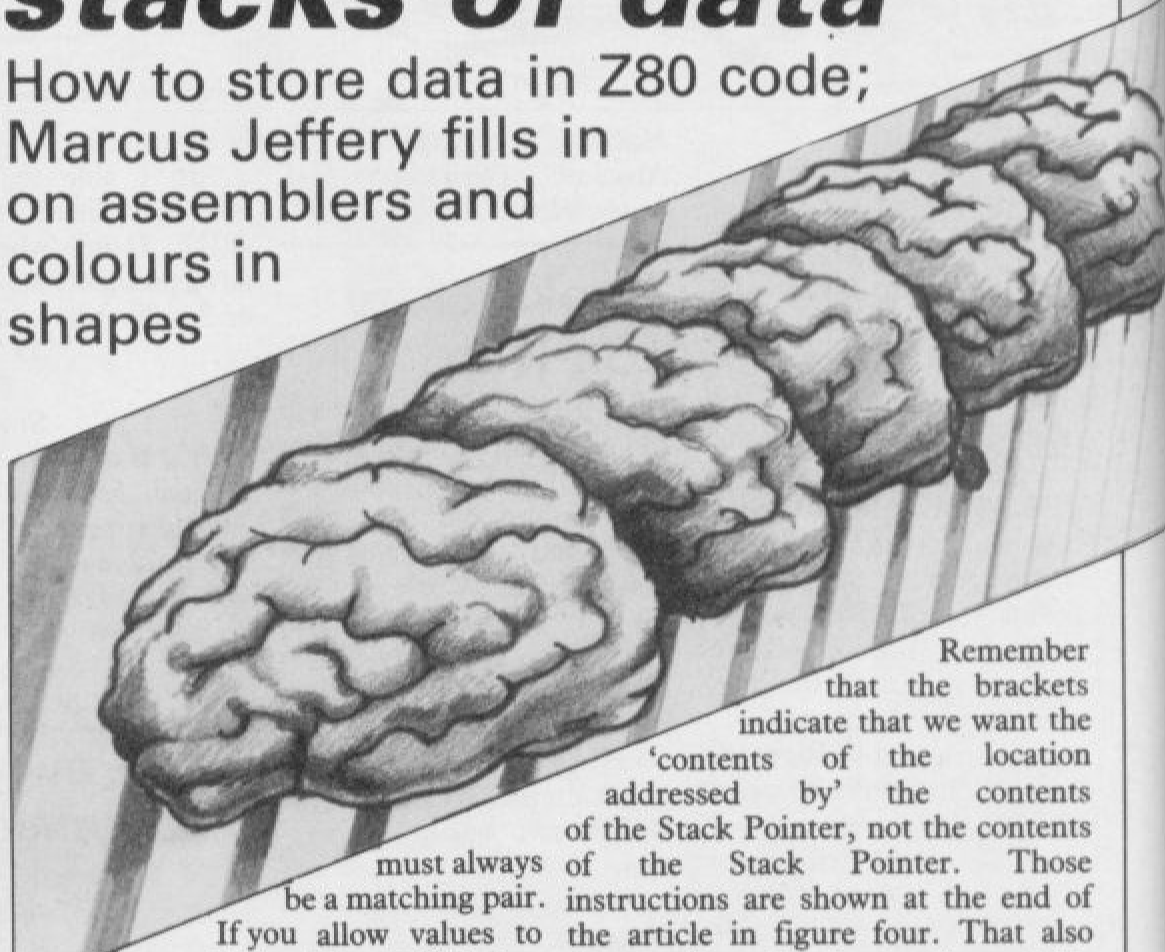
I BOUGHT a Spectrum Plus upgrade kit and when I tried to attach my Kempston interface and joystick, it would not fit. It looks as though I will have to buy a ribbon connector.

D N Tandziel, Middlesborough, Cleveland

● *Although electrically there is no great difference between a Spectrum and Spectrum Plus they are physically different and some add-ons will not fit in the back of a Plus. If possible check before buying.*

Shaping up with stacks of data

How to store data in Z80 code; Marcus Jeffery fills in on assemblers and colours in shapes



ONE OF THE biggest problems when using Z80 machine code is finding places to put numbers. In Basic, there are plenty of variables and arrays which can be used to store data, but in Z80 there are just a few registers.

One way around that is to use an instruction:

LD (address), register

which would place the value of the register into the contents of the specified address. A better method, however, is known as the 'stack'.

A stack is a type of data structure, in much the same way as an array, list, queue and so on. With an array, you tell the computer which element you want by giving the array subscripts. With a list, you start at the 'head' and move towards the 'tail'. A queue is known as a First In First Out (FIFO) structure because you add items to the end of the queue and take them away from the start.

A stack is a Last In First Out (LIFO) structure. Imagine a stack of plates. Trying to take a plate from the middle of the stack is likely to have disastrous results. You will probably also have problems if you try to put a plate into the middle. You can only safely place and remove plates from the top. In Z80 machine code, those operations are known as PUSH and POP.

Z80 only allows you to PUSH and POP two registers at a time, giving the instructions:

```
PUSH AF ; POP AF
PUSH BC ; POP BC
PUSH DE ; POP DE
PUSH HL ; POP HL
```

So, for example, the code

```
LD HL, 1234
PUSH HL
LD HL, 4321
```

would leave HL containing the number 4321. However, if we now execute the instruction

POP HL

then the number 1234 will be restored to HL. One interesting point is that the stack does not know which registers it has stacked; all it has done is place two bytes onto the stack. Therefore, instead of the last instruction, we could just as easily use, say,

POP BC

which would overwrite the contents of the BC registers with the number 1234.

The main point to remember when using PUSHes and POPs is that they must always be a matching pair. If you allow values to be stacked without POPping, the area set aside for the stack will eventually run out of room.

The location of the top of the stack is held in a register pair called, surprisingly, the Stack Pointer, which is abbreviated to SP. Bearing that in mind, another useful instruction is

EX (SP), HL

which will exchange the last two bytes placed on the stack with the contents of the HL register pair.

Remember that the brackets indicate that we want the 'contents of the location addressed by' the contents of the Stack Pointer, not the contents of the Stack Pointer. Those instructions are shown at the end of the article in figure four. That also shows a few other instructions which operate on the Stack Pointer, though you're unlikely to find those very useful as yet.

Though your use of the stack is likely to be limited to the above instructions under most circumstances, it is far more flexible. For example, you will have noticed the instructions CALL and RET in recent programs. Those act in the same way as GO SUB and RETURN

Figure 1

```
  10 CLEAR 59999
  20 GO SUB 1000
  30 CLS
  40 CIRCLE 120,100,20
  50 POKE 23728,120: POKE 23729,
100
  60 RANDOMIZE USR 60000
 100 STOP
1000 REM HEX LOAD ROUTINE
1010 DEF FN p(x)=CODE h$(x)-48-7
*(CODE h$(x)>=65)
1020 LET byte=0
1030 RESTORE 2000
1040 READ start
1050 READ h$
1060 IF h$="*" THEN  GO TO 1160
1070 IF LEN h$<>2*INT (LEN h$/2)
 THEN  PRINT "Odd number of hex
digits in: ";h$: STOP
1080 FOR i=1 TO LEN h$
1090 IF NOT ((h$(i)>="0" AND h$(
i)<="9") OR (h$(i)>="A" AND h$(i
)<="F")) THEN  PRINT  "Illegal h
ex digit: ";h$(i): STOP
1100 NEXT i
1110 FOR i=1 TO LEN h$ STEP 2
1120 POKE start+byte,16*FN p(i)+
FN p(i+1)
1130 LET byte=byte+1
1140 NEXT i
1150 GO TO 1050
1160 PRINT "Code entered"
1170 PAUSE 150
1180 RETURN
2000 DATA 60000,"ED4BB05C"
2010 DATA "CD68EA","C9"
2020 DATA "C5","CD8EEA","C1"
2030 DATA "5F","A6","C0","7B"
2040 DATA "CDBEEA","C5","04"
2050 DATA "3EB0","90","C468EA"
2060 DATA "C1","C5","05"
2070 DATA "E468EA","C1","C5"
2080 DATA "0C","C468EA","C1"
2090 DATA "0D","E468EA","C9"
2100 DATA "79","E607","5F"
2110 DATA "CB39","CB39","CB39"
2120 DATA "3EAF","90","47"
2130 DATA "E638","CB27","CB27"
2140 DATA "B1","6F","78","E607"
2150 DATA "67","78","E6C0"
2160 DATA "CB3F","CB3F","CB3F"
2170 DATA "84","C640","67","43"
2180 DATA "04","AF","37","CB1F"
2190 DATA "10FC","C9"
2200 DATA "B6","77","C9","*"
```

in Spectrum Basic. The instruction

CALL address

transfers execution to the specified address, and

RET

returns to the instruction immediately following the CALL. However, when that happens, the computer has got to know where to return to. Consequently, when the CALL instruction is executed, the computer PUSHes the value of the location following the CALL statement onto the stack. Then, when a RETurn statement is found, the stack is POPped to tell the computer which code to execute next.

Now we are ready for this month's example program, which will allow you to fill in any shape on the screen. To run this just type in and run the Basic program in figure one — the Hex Loader is the same as usual. To use the routine generally, POKE the x-coordinate into location 23728 and the y-coordinate into 23729. Those two locations among the system variables — *User Guide*, page 130 — are normally unused.

Figure two shows the equivalent in assembly code. The PBYTE routine takes the screen coordinates 'x' and 'y' — in C and B, respectively — and calculates the coordinates of the screen byte, placing the result into the HL register pair. In addition, a single bit is set in the A register, corresponding to the bit within the HL byte which represents the (x,y) coordinate. The letters in brackets, given in the comments on the right-hand side of the listing, refer to figure three, which should help to explain how the BC coordinates are converted into the HL location.

The routine works by filling in the (x,y) pixel — assuming that it is not already filled — then doing the same for the pixels to the North, South, East and West. Those in turn, if filled, will fill in four directions, and so on.

In that way, the whole shape is filled. By writing a general routine — FBYTE — to carry out the operation, it can 'call itself' to fill to the North, South, East and West!

Figure 2

```
                        ORG     60000
                        LOAD    60000

EA60 ED4BB05C FILL      LD      BC,(23728)      ;Get start coordinates
EA64 CD68EA             CALL    FBYTE           ;Fill from here
EA67 C9                 RET                     ;RETurn to BASIC

EA68 C5       FBYTE     PUSH    BC              ;Stack BC *
EA69 CD8EEA             CALL    PBYTE           ;HL = Screen address
EA6C C1                 POP     BC              ;Restore BC (coordinates) *
EA6D 5F                 LD      E,A             ;Save A (bit mask) *
EA6E A6                 AND     (HL)            ;If Screen bit not empty,
EA6F C0                 RET     NZ              ;    then RETurn
EA70 7B                 LD      A,E             ;Restore A *
EA71 CDBEEA             CALL    PSCRN           ;Fill the screen point
EA74 C5                 PUSH    BC              ;Stack coordinate *
EA75 04                 INC     B               ;Look NORTH
EA76 3EB0               LD      A,176
EA78 90                 SUB     B
EA79 C468EA             CALL    NZ,FBYTE
EA7C C1                 POP     BC              ;Restore coordinate *
EA7D C5                 PUSH    BC              ;Stack coordinate *
EA7E 05                 DEC     B               ;Look SOUTH
EA7F E468EA             CALL    PO,FBYTE
EA82 C1                 POP     BC              ;Restore coordinate *
EA83 C5                 PUSH    BC              ;Stack coordinate *
EA84 0C                 INC     C               ;Look EAST
EA85 C468EA             CALL    NZ,FBYTE
EA88 C1                 POP     BC              ;Restore coordinate *
EA89 0D                 DEC     C               ;Look WEST
EA8A E468EA             CALL    PO,FBYTE
EA8D C9                 RET

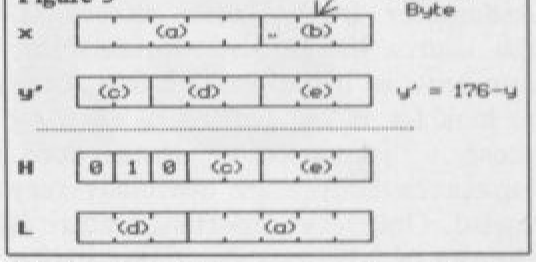
EA8E 79       PBYTE     LD      A,C
EA8F E607               AND     7               ;Get bit in byte (b)
EA91 5F                 LD      E,A
EA92 CB39               SRL     C               ;Get (a) in register C
EA94 CB39               SRL     C
EA96 CB39               SRL     C
EA98 3EAF               LD      A,175           ;Convert y-coord. to give
EA9A 90                 SUB     B               ;    (0,0) at top-left
EA9B 47                 LD      B,A
EA9C E638               AND     56              ;Get (d) in register A
EA9E CB27               SLA     A
EAA0 CB27               SLA     A
EAA2 B1                 OR      C               ;Get (d)+(a) in reg. A
EAA3 6F                 LD      L,A             ;    then move to reg. L
EAA4 78                 LD      A,B
EAA5 E607               AND     7               ;Get (e) in register A
EAA7 67                 LD      H,A             ;Place temporarily in H
EAA8 78                 LD      A,B
EAA9 E6C0               AND     192             ;Get (c) in register A
EAAB CB3F               SRL     A               ;Move to position
EAAD CB3F               SRL     A
EAAF CB3F               SRL     A
EAB1 84                 ADD     H               ;Add (e)
EAB2 C640               ADD     64              ;Add screen base address
EAB4 67                 LD      H,A             ;Place in register H
EAB5 43                 LD      B,E             ;B = bit in byte (0-7)
EAB6 04                 INC     B               ;B = bit in byte (1-8)
EAB7 AF                 XOR     A               ;Clears A register
EAB8 37                 SCF                     ;Set carry flag, then
EAB9 CB1F     PBLOOP    RR      A               ;    rotate carry into
EABB 10FC               DJNZ    PBLOOP          ;    bit position in A
EABD C9                 RET                     ;RETurn

EABE B6       PSCRN     OR      (HL)            ;Set screen bit by ORing
EABF 77                 LD      (HL),A          ;    mask with current screen
EAC0 C9                 RET

                        END

Workarea - A800 to A956
ORG  end - EAC1
LOAD end - EAC1
```

Figure 3



Remember that the return locations from the CALLs are all stacked, so the routine always knows where to return to. The only problem is that the (x,y) coordinates in BC would be overwritten, so we must stack those too. The comments marked with asterisks show which instructions are connected with saving and restoring values — imagine how messy that would be without the stack!

That is by no means the quickest way of filling shapes, but is probably quick enough for most purposes. You might like to try it out in Basic. You can easily implement a stack, as follows:

```
      1 DIM s(1000)
      2 LET sp = 0
PUSH: 1000 LET s(sp) = xcoord
      1010 LET s(sp+1) = ycoord
      1020 LET sp = sp+2
      1030 RETURN
POP:  2000 LET sp = sp-2
      2010 LET ycoord = s(sp+1)
      2020 LET xcoord = s(sp)
      2030 RETURN
```

The major problem with this method of filling shapes is that it uses enormous amounts of stack space. If you try to fill large shapes on the screen, you may find the whole computer crashing as the stack runs out of space. The easy way to avoid that is to split large spaces into a number of smaller shapes.

Assemblers

If you are sufficiently attracted to the advantages of using machine code, then you will probably consider purchasing an Assembler package. The assembly code listings given in these articles use **Spectre-Mac-Mon** from Oasis Software, but other assemblers may have slightly different formats.

Assembly code is usually divided into a number of fields. Those are

LABEL MNEMONIC
OPERAND COMMENT

In some cases, such as the **Zeus**

continued on page 48

continued from page 47

Assembler from Sinclair Research, the source listing also contains line numbers, as in Basic. The first thing to look for is the method of entering those formatted instructions. On-screen editors are obviously very useful. One very important feature is the use of labels — don't buy it if it doesn't use them.

In addition to the normal Z80 mnemonic instructions, most assemblers include 'pseudo-operations'. Those include such mnemonics as ORG, to tell the computer where in memory to assemble the code. EQU allows constants to be assigned label names, making the listing more readable. DB — or similar — standing for Define Byte, allows memory locations to be initialised to particular values.

It is often possible to define 'macros', which allow you to assign a name to a sequence of instructions. Conditional assembly allows you to decide whether certain pieces of code are assembled at assembly-time. Many more features may be found, varying between assemblers.

Many assemblers include 'monitors'. Those allow you to examine memory, while running machine code. Though not absolutely necessary, the more serious machine code user will find those invaluable. Some important additional features to look for are the setting of 'break points', single-stepping, examination of registers, intelligent copy, modify memory and disassembly.

When converting listed programs for your own assembler, the two main points to check are:

The Format: assemblers differ in the fields, length of labels, format of numbers, and so on;

The Memory: assemblers are likely to use different areas of memory. For instance, the routines given have all started from location 60000. However, the **Zeus Assembler** uses that as workspace, so the routines should be changed to start at, say, 30000.

In all cases, check with the documentation given with your assembler.

Figure 4: New Z80 instruction codes

PUSH rp	— place the register pair (AF, BC, DE, HL) onto the top of the stack.
POP rp	— remove the top two bytes from the top of the stack, placing the contents into the register pair (AF, BC, DE, HL).
EX (SP), HL	— exchange the two bytes from the top of the stack with the contents of the HL register pair.

Of the instructions we have seen so far, the following can also be used with the Stack.

ADD HL, SP	— add the Stack Pointer to the HL register pair.
DEC SP	— decrement the Stack Pointer by one.
INC SP	— increment the Stack Pointer by one.
LD SP, (addr)	— set the Stack Pointer to the contents of the specified address.
LD SP, data	— place the given data into the Stack Pointer.
LD SP, HL	— set the Stack Pointer to the contents of the HL register pair.
LD (addr), SP	— place the contents of the Stack Pointer into the given address.



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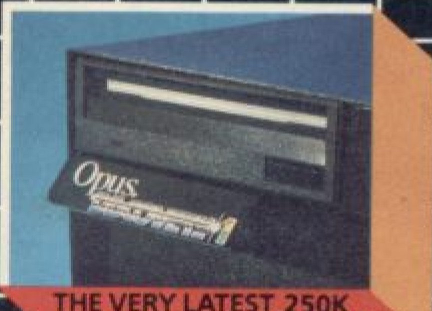
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Amateur games — all washed up?

THOSE GOLDEN DAYS when you could buy a personal fleet of flash cars with the massive earnings from **Alien Attack** are long gone — if indeed they were ever here.

It is not as easy as it was to get your programs accepted by software houses, and even if you are successful, you will be lucky to afford a second-hand C5, let alone the proverbial Porsche. Writing software is as time consuming as ever — getting it published is a different ball game altogether and very frustrating.

A potential hit game has to combine originality with good graphics and instant playability. However, the quality of programming has improved dramatically in the last three years with games like Ultimate's **Knight Lore**, and it is becoming increasingly difficult for amateur programmers to come up with the goods.

Once a program has been completed to your satisfaction, you will want to send if off for evaluation. Software houses tend to specialise in programs of a particular kind, whether they are arcade games, adventures, simulations, utilities or strategy games. Although many software houses publish programs from several categories, it is best to pick publishers most suited to the software you have written.

Software publishers can also be divided into two further categories — those which deal in top of the range games and those which deal with budget software. Again, a number of

companies produce both.

Mike Cohen, managing director of Lothlorien says, "Up to a year ago, we were being sent games which we could put out. The market then became more critical and a higher standard is now demanded. Meanwhile, budget software surged forward and youngsters got their games accepted because of the budget ranges."

Andrew Hewson of Hewson Consultants feels strongly against pocket money software. "We're not interested in the budget range because of the aura associated with it." He feels that if a game is good, it deserves to be marketed at a reasonable price.

Although everything depends on programming quality, it is easier to get your first attempts accepted by a budget software house than one dealing with more complex software.

Two such companies are Mastertronic and Firebird, which publishes its Silver range. "Budget software provides an opportunity for new software writers to enter the market," says James Leavey of Firebird. "We are fairly demanding and look for well programmed, machine code games."

Leavey believes that programmers of the Silver range may one day come up with a game worthy to be sold in the more expensive Gold range. "They've got to start somewhere — they are the programmers of the future." And just because a game is sold on a budget label, it does not mean that it will not be successful.

Writing a good game is just a beginning. Clare Edgeley talks to programmers and publishers, charting the software scene

Booty has sold over 100,000 units for Firebird and **Chiller**, Mastertronic's most successful game has sold over 100,000 copies on the Commodore 64 and 30,000 on the Spectrum.

John and Jan Peel of Legend, which produced **Valhalla**, always come up with their own games ideas and employ a team of in-house programmers.

"Games which people have sent in are not even good enough to return asking for improvements," says Jan Peel. "I can say that the best stuff submitted wasn't too boring." One program submitted was a BMX bike game which had the spectators moving while the bike remained still.

Many larger companies employ teams of in-house programmers, or freelance programming houses, to produce their software and very rarely use programs sent in for evaulation. "Lots of programmers don't have the three arts — programming, music and graphics," explains Ocean's Paul Finnigan. Special teams are put together to work on each game, dealing exclusively with those three areas.

"It is easier to get accepted by a budget software house at first"

Finnigan continues, "If someone from the outside sent in a good game, we would invite him to come in and produce the game with the team or in some cases give him a job."

"We have all sorts of development equipment," explains Finnigan. "The games are written on an Einstein or Sage and then downloaded to the Spectrum and Commodore 64, where the music and other extras are added."

Software houses tend to receive huge numbers of games for evaluation each month. Many fall by the wayside immediately, either because they lack originality, or because they are unplayable. Companies are not interested in fruit machine games or yet another **PacMan**, however good.

Mastertronic processes around 200 games a month and in May this year 220 games were looked at. Two games were picked out — one which was almost marketable and one requiring more development. It publishes between four and six games a month, and has 40 or 50 people working on games which are at various stages of completion.

John Maxwell from Mastertronic explains why many games cannot be looked at properly. "We can only spend ten minutes on each and many come in without instructions or any form of documentation and so cannot be evaluated properly." That is especially important if you are submitting an adventure game. Without a map it would be impossible to evaluate within the 10 minutes available.

Howard Gilberts from Gilsoft, the company which has changed adventure writing with **The Quill**, feels that documentation is essential when sending in a utility program. "Those utilities which rely on a handbook should have a draft of that sent in as well. The handbook should be easily understood, free from mistakes and presented in an interesting way. The handbook is as important as the utility."

When your game has been accepted it is normal procedure to sign a contract with the publishing house concerned. It is always a good idea to have a contract checked by a solicitor but there are a few points you could look out for yourself.

The company will usually buy the licence to market your game, although you will retain the copyright. Check the length of time they will hold that licence — it can vary from one year to an indefinite period.

If possible, ensure that the company you are dealing with is rock solid and not about to go into liquidation. If the company goes bankrupt make sure that the licence reverts to you and not to the liquidator. Then you will be able to resell the game.

Have you sold the licence to your game for European or world rights? An important point — a company might hold only the European rights, yet you will not know whether the game is being sold in the States.

Contracts also state how you are being paid, whether by royalties and an advance, or just a flat payment. Christian Penfold from Automata

continued on page 54

Dividing the spoils

THIS is how the costing of a typical game priced at £6.95 breaks down. The figures given are speculative and would apply to a small company with few overheads.

The game is sold to the distributor for £3.82 leaving the software house £3.13 to cover all costs. Fifty per cent covers the cost of the blank cassette, duplicating and the insert, while the artwork and advertising costs £1.00. Bulk delivery to distributors and the like costs about five pence per game.

Royalties for the author are 40 pence and administration, including telephone and all other overheads costs 30 pence — leaving the software house a profit of 88 pence.

continued from page 53

offers some advice. "Make sure a figure is stated rather than a percentage of the profit. Some software houses are entitled to deduct packaging, advertising, duplication and other costs from the price before royalties are worked out — the percentage is therefore lower than it looks."

Royalties are usually based not on the retail price of the software, but on the sum left after selling the game to a distributor. Distributors will take, on average, a 55 per cent discount.

Royalty payments are usually calculated against the number of units the company expects to sell. If you think your game will sell less than the company has predicted go for a lump sum payment. However, if you feel it will be a success go for royalties, and an advance if possible.

Advances can range from £100 to £2000 and upwards depending on the quality of the game. Royalties can range from 4 per cent to 20 per cent. If you receive a large advance, the chances are that the royalties payments will be lower and vice versa.

Considering the software market has been chaotic over the last year, there is still a surprisingly large number of companies willing to accept games as long as they come up to standard. There is no point sending in a game only good enough for a magazine listing. The software house will not even look at it. If you can come up with the goods – they'll take it.

Case Histories



STEPHEN CURTIS from Wales is 22 years old, and became interested in computing at college.

"The first game I sold was Hammer House of Horror in 1983 to Lasersound. I signed the contract but the company went bust, although I did get the advance."

Stephen has written about 13 games of which 10 have been published. They include Morris Meets the Bikers for Automata, Tiler for Interceptor and his latest game, Nonterraqueous for Mastertonic, written with Mark Jacobs.

"Approach four or five companies with your game — most won't reply unless they want it. I sent Nonterraqueous to four before Mastertronic.

"In February one company offered me 50 pence for Nonterraqueous and they had a game in the top ten. The royalty rate was only about 4 per cent."

Stephen's advice to anyone thinking of going freelance is "Don't bother. Mainly because computer programs are becoming more and more sophisticated and development times are becoming longer and longer for less money."



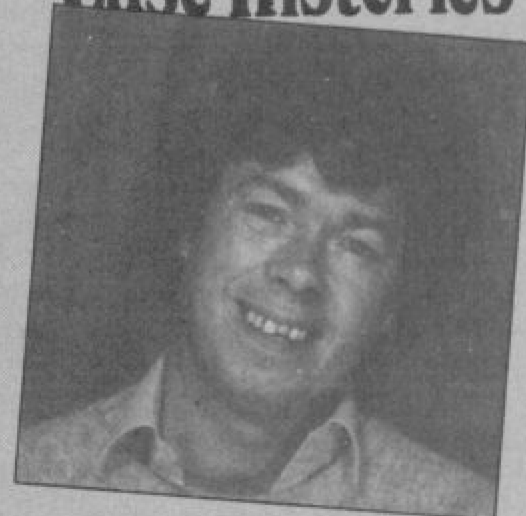
JOHN PRAGNELL from London is 28 years old and works as an advertising manager for *IBM Systems User*.

"I got hold of an assembler and set myself a target — I visualised it but didn't make any detailed plans." The result — Overlords — was completed in February 1985 after nine months' programming.

John sent the game to a number of companies including CCS, Activision and Hewson Consultants. At least two companies suggested that he try Lothlorien. Lothlorien suggested enhancements which took a further two months and paid £500 advances on 15 per cent royalties. John expects to receive around 30 pence for each unit sold.

John has already started on another game which he expects will take six months to write.

"I would consider going freelance as programming is satisfactory and addictive. It's a risk. You have to work for seven or eight months with no income, you get paid and start all over again. The biggest problem I had was time — if you've got a lot of time to spare you're OK. I'd like to work like that more."



MIKE SINGLETON from Mersey is 34 years old and taught English in a secondary school. Three years ago he went freelance as a programmer.

He became interested in computing in 1980. After six months he decided to learn 6502 machine code. He wrote his first game, Space Ace, in machine code, which he sold to the now deceased software house Petsoft. It sold around 100 copies. "The royalties in those days were pathetic, you couldn't last a week on them."

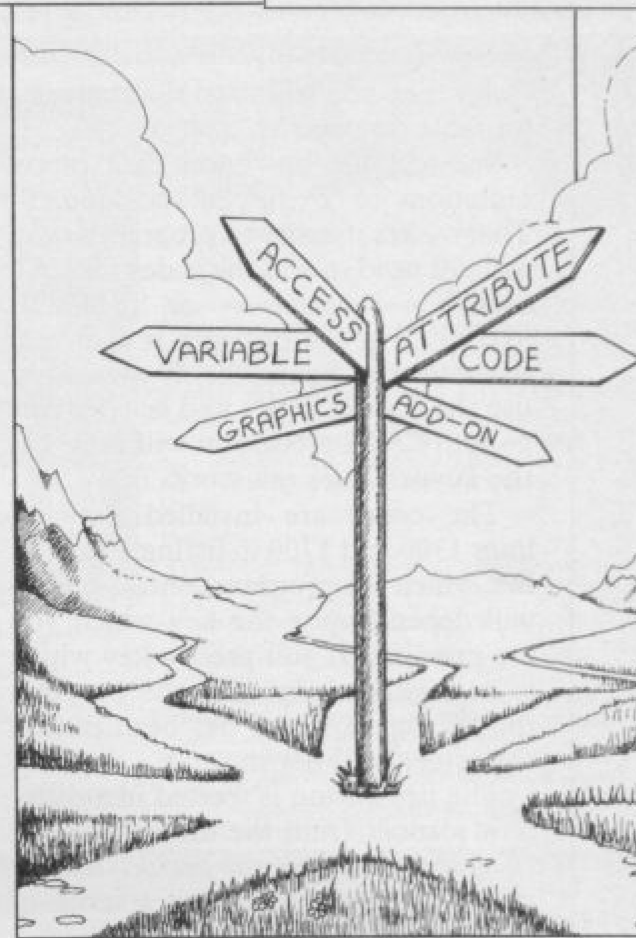
He then wrote a number of games for different companies — one of his most successful being Snake Pit for Postern, written for the Pet and later converted to the Spectrum.

His big break came in 1983 when he was approached by Beyond Software to write a game for them. Nine months later Lords of Midnight was launched. Doomdark's Revenge followed and Mike is at present working on another game for Beyond.

After Space Ace, publishers have always approached him. His advice, "If you've got faith in your own abilities, go for royalties rather than a salary."

Finding the key to control

John Gilbert shows how to program a simple keypad



SO FAR IN this series we have dealt with computer operations, such as input and output, as isolated actions.

Even in the simplest program, however, that is not the case. It is a feature inherent in Basic that one part of a program will have some effect on, or contact with, another part.

You may think that is untrue because you can write programs which are made up of a series of subroutines, eliminating the use of GOTOs. Even then, however, you need to call those subroutines from somewhere within the program. Each routine is also likely to share variables with other parts of the program.

Adherents to the structure school of thought are often fanatics who will condemn a program if they spot a GOTO. Although I have sympathy with them I admit that GOTO has its uses.

For that reason, and also partly to get up the noses of structure fanatics, the Entry Program this month includes many GOTOs. In the form shown in listing one it is easy to read and would have been longer if split into subroutines with a control routine at the top of the program, and the co-ordinate update would be unnecessarily complex.

The program also combines several topics featured in past articles. The program creates a keyboard control device, called a keypad, which operates in a similar way to a joystick. It is used to move a character around the screen and then explode it. To do that we will be using the CODE function, introducing a derivative of the INPUT command and skimming the surface of random number generation.

Firstly, however, we must design the keypad. As it will probably need two hands to manipulate, the keypad should be in the centre of the keyboard and use the key configuration shown in figure one.

I have chosen 'F' as the fire key, at the centre of the keypad, so that the control device is easy to find.

If you read the previous article on codes, each key has a number allocated to it. The computer recognises a key by its code so it makes sense to bypass any conversion of character to code and give the computer a numeric value for each key.

If you have the *Sinclair Spectrum Basic Programming Manual* turn to the list of character codes in appendix A. If, however, you are unfortunate enough to have the *Spectrum Plus User*

continued on page 56

Listing 1

```
 100 CLS
 200 LET x=10: LET y=10
 300 IF x>21 THEN  LET x=21
 310 PRINT AT x,y;"X"
 400 PAUSE 0: LET a$=INKEY$
 500 PRINT AT x,y;" "
 600 GO TO 1300
 700 FOR k=1 TO 30
 800 LET a=INT (RND*7)+1
 900 BORDER a
1100 NEXT k
1200 STOP
1300 IF a$=CHR$ (114) THEN  GO T
O 3000
1400 IF a$=CHR$ (103) THEN  GO T
O 4000
1500 IF a$=CHR$ (118) THEN  GO T
O 5000
1600 IF a$=CHR$ (100) THEN  GO T
O 6000
1700 IF a$=CHR$ (102) THEN  GO T
O 700
1800 GO TO 300
3000 REM north
3100 LET x=x-1
3200 GO TO 300
4000 REM east
4100 LET y=y+1
4200 GO TO 300
5000 REM south
5100 LET x=x+1
5200 GO TO 300
6000 REM west
6100 LET y=y-1
6200 GO TO 300
```

Line 100 and **200** clear the screen and set up the X,Y co-ordinates at which the X will be printed.

Line 300 checks to make sure that the X does not run off the bottom of the screen. If the variable X should contain a number which is more than 21, usually the last line on which you can print, it is changed to equal 21.

Lines 310 to **500** produce movement and ask for the direction in which you want the X to move. **Line 400** uses a new type of input. INKEY$ will look at the keyboard for an instant. If a key is being depressed it will report it to the computer. Unfortunately INKEY$ does not wait for an input. To remedy that I have put PAUSE 0 before it which will pause until a key is depressed. Using INKEY$ the key will be put into a$. **Line 600** transfers control to the routine at 1300 which finds the key which has been depressed.

Lines 700 to **1200** is the Fire routine. **Line 800** produces a random number between one and seven which is used as a border colour at line 900. The program then STOPs at line 1200.

Lines 1300 to **1800** look at the character codes allowed by the keypad and if one matches with the input key, control is passed to one of the routines between 1800 and 6200 which update the X,Y co-ordinates. **Line 1800** returns for more input regardless of whether or not a valid key has been pressed.

Lines 3000 to **6200** are made up of four three-line routines. Those update the X,Y values and return to line 300 where the X characater is reprinted in its old position, the old X character being rubbed out by line 500.

continued from page 55

Guide then you will need the character set table on page 51.

We will use the lower case representations of 'r', 'g', 'v', 'd' and 'f'. That makes it easier to program as you will not need to add the codes for CAP SHIFT — capitals — or SYMBOL SHIFT. The list of codes is shown at the bottom of figure one. If you do not use the correct codes and accidentally go into CAPS mode you will find that the keypad does not work.

The codes are installed between lines 1300 and 1700 in listing one. The line which the program control goes to will depend upon the key which you are pressing. If you press a key which is not acknowledged by the program the 'X' figure which has been put on the screen will not move.

The fire button is treated in a different manner from the direction keys. Its control is one of the reasons for not splitting the program into a series of subroutines.

The heart of the movement routine, between lines 300 and 500, has two exit points. The usual exit is at line 300. Where the fire key is recognised a transfer of control is then made to line 700 which contains the animation sequence when the bomb goes off.

The animation routine, which starts at line 700, is novel as it randomises the effect. It uses the function RND which, on its own, generates a random number between zero and one. For instance, typing LET A=RND might put .12345678 into A. That is not much good to us for generating something like a colour or BEEP sound which requires a digit not less than zero and not greater than nine.

To generate a whole, integer, number between one and range_top the formula would be LET A=INT (RND* range_top)+1. For instance LET A=INT (RND*5)+1 would give a number within the range 1 to 5. The INT in the formula means INTeger. It chops off the decimal part of a number and rounds the result down.

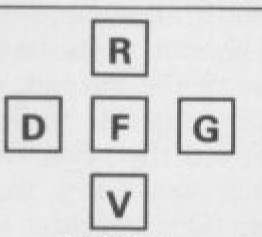
The one to range_top formula is used to randomise colours for the explosion in the program. That is not all the RND function can do. In next month's article, we will be using it to design a pseudo-random maze.

Back to listing one. If you have run the program and tried to move the 'X' off the bottom of the screen you will have found that an error occurs and the program stops. You have exceeded the bounds of the display and, unlike the QL, the Spectrum will not keep track of a line or object when it falls off the display edge.

The error will only occur, however, when you move the 'X' to the bottom of the screen. Try moving it to one of the other three sides of the screen. You will find that the 'X' gets to the edge of the screen and bounces off it to start back towards the centre again. The effect is yet another Spectrum screen enigma.

Luckily we can use the effect to advantage in the example, as we only have to error trap the bottom of the screen so that the 'out of screen' error does not occur. The only way to do that is to have a line in the program, such as 300, which checks on the Y axis of the screen display and, if it is equal to, or more than, the screen boundary, halts all errors.

One limitation of listing one is that the 'X' will wipe out anything which is in its path. You cannot have a user defined background such as a maze or a picture. You can, of course put up different background colours, using the PAPER function, but you could not have a permanent backdrop.



KEY	ACTION	CODE
r	up	114
g	right	103
v	down	118
d	left	100
f	fire	102

Figure 1 Keypad and codes

The Spectrum comes to the rescue again, however, with a Basic function called OVER. Its argument, the number which follows it, can either be a zero or one and it operates in a similar way to the INVERSE and FLASH functions. Typing OVER 1 will switch the effect on and typing OVER 0 will switch it off again.

Usually all objects are printed on the background of the screen but it is possible to add another layer. The best way to describe the operation is to use the analogy of an animated cartoon. Backgrounds are produced on card and the characters are painted onto transparent plastic sheets which are then laid over the background. When OVER is switched on the moveable character can be printed on top of the background without destroying it.

```
10 CLS
20 FOR k=1 TO 10
30 PRINT "XXXXXXXXXX"
40 NEXT k
50 OVER 1: PRINT AT 1,1;"S"
60 PAUSE 0
70 PRINT AT 1,1;"S"
80 PAUSE 0
90 GO TO 10
```
Listing 2

Listing two shows the effect. First a small block of Xs are drawn as a background using a FOR . . . NEXT loop. The OVER function is switched on at line 50, (OVER 1), and on the same line 'S' is printed over the 'X' at coordinates 1,1. The PAUSE 0 at line 60 will hold the program until you press any key when it will continue.

Line 70 produces an unusual result. You may think, from looking at it, that another 'S' will be printed at location 1,1 but the reverse is true. It will wipe out the original 'S' leaving the 'X' in position.

The disappearance of the character is due to the way in which the characters are represented in memory when the OVER option is on.

Two states are possible on the screen and these are represented as INK, or one, and no INK, or zero. Those two states flip over. For instance, if you have a one, or INK state, the next time you apply an operation to that location it will become a non-INK, or white, area — the one flips over to become a zero.

The odd effect means that you do not have to use a PRINT statement and a space between quotes to make a character vanish. You can just switch OVER on and re-use the PRINT statement which causes the character to be displayed.

You can now change the program to cope with any backgrounds you may wish to put behind the moving 'X'. You could design a screen using one of many screen designer packages on the market and then LOAD your effort using the SCREEN$ function before you run the program. You could also change the 'X' into your own UDG and animate it in the manner explained in the last article. Just remember to add OVER 1 at the top of the program before you use it.

Next month, as promised, I will be delving into the random number generator. I will also be showing how to generate massive random mazes.

I will also look at sensible ways in which to structure a program and when you can eliminate GOTOs to enhance the RUNning of a program.

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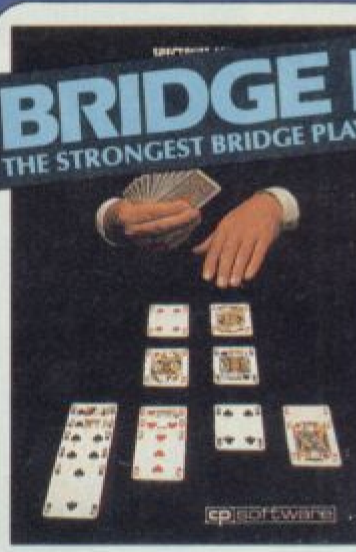
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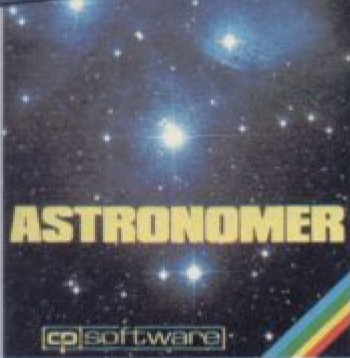
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UM USER YOU'LL
E SPECIFICATIONS.



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Proof indeed that the Triton has all the capabilities of its more expensive rivals.

AS TEST DRIVEN BY THE EXPERTS.

New it may be, but the Triton Quick Disk is already receiving rave reviews in the computer press. For example, in a recent Home Computing Weekly article it picked up their much coveted "Flipped" award.

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SU

IT'S GIVEN UP the ghost. You're tearing your hair out, practically climbing up the walls trying to get the damn thing to function but NOTHING WORKS.

What can you do? Chuck it out of the window? Thump it? Kick it? You're more likely to curse aloud and start poking its insides around — but don't. Although it's tempting to go for it with the soldering iron, you'll probably do more harm than good. People messing about with their micro's innards are half the reason third party maintenance companies are in business at all.

But once your micro is in the hands of those people, what will they do to it? Will you get your money's worth? And how long will you have to wait?

Advice from the maintenance companies is loud and clear — leave the messing around to the experts, or you'll be sorry. Not only do they have machines admitted to their sick rooms all choked up and covered in biscuit crumbs, coke and lemonade, but there is also evidence that many users fancy themselves as amateur surgeons and completely wreck their machines.

Nothing is more useless than a blown Spectrum. Wendie Pearson finds gold at the end of the soldering iron



Verran Computer-fix in Camberley runs an insurance scheme in conjunction with the Domestic and General Insurance Company in Wimbledon.

Verran has a First Aid Plan covering all home computers with premiums based on the machine's value. Micros worth up to £150 cost £16.60 for a 12 month guarantee covering fire, theft and damage. Machines worth between £150 and £299.99 cost £22.60 for the same cover and the QL, at under £600, would be £30.60. On the peripherals side, a printer worth £300 would be covered for £29.60.

The company is run by commercial manager, Laurence Fritwell who says, "Computer-fix is the biggest computer services company in the world, with branches in France, Spain and Germany. It's an advantage to work with an insurance company as it gives a company more credibility."

Fritwell says their Superfast repair service will turn machines around within seven days, subject to availability of spares.

"Our prices include postage and transit insurance. It's a fast and direct repair and we have a comprehensive range of computerised test equipment to see what's wrong with a machine when it arrives."

Like every other maintenance company we talked to, Fritwell says the main preventable problem is plugging an interface into the Spectrum while it is still on. That does ghastly things to the PCB. "It's rare that we have an irreparable machine, but people do horrific things to them," he says. "One person put 240 volts down the ear and microphone socket and that sort of thing blows every chip on the board."

Eric Allen, marketing manager of Domestic and General says, "We don't take on people from outside the UK. It is very complicated, as you have to conform to the individual country's regulations. If a foreign user approached us, we would refer them to repair agents here."

D & G operate various schemes through a number of companies including RCS Computer Services in

Down but not out

Feltham, who deal with Acorn machines, and John Menzies. They also run a general scheme called Computer Care. That is available through various retailers although, oddly, Dixons, Boots and Currys will not do it. "They haven't seen that there is a market need for it," says Allen. Slapped wrists for all three!

Computer Care is taken out within 30 days of purchasing your micro and costs £12.60 a year for a micro worth under £150, giving you a one year extension to your guarantee. If you want to extend it for four years, it costs £25.60.

D & G are covered by the Department of Trade & Industry so that policy holders are protected by the 1976 Policyholders Protection Act. That safeguards the end user in the event of a third party maintenance company going into liquidation. If that happens, you then have redress to the British Insurance Association which deals with claims of that sort.

It seems, however, that few people insure their micro when they first buy it. "Most people don't take out a policy until the thing breaks down," says Fritwell. "At the same time, it's like any other insurance policy and the reason more people don't insure their micros is that they're often unaware that there is a breakdown policy of this kind available."

One company there to help when your Spectrum gets sick is Mancomp Ltd, based in Manchester and run by Mike Bhatt. Of all the repair companies *Sinclair User* spoke to, this one seemed the most professional when it came to advice and a helpful attitude.

Bhatt is insistent that anyone with a problem should phone him at his premises, tucked away between Manchester City Centre and Stockport. He is happy to give all the advice he can over the phone.

Mancomp runs bilingual ads with half in German. That caters for overseas readers and is a considerate gesture on the part of Mancomp. The company has a multilingual member of staff who speaks German, French and Italian and helps specifically with overseas enquiries, which account for a fair proportion of its business.

There is no set price for repairs. "We try to be flexible, depending on the problem. The minimum price is £9.00 and the maximum £23," says Bhatt. "We will repair things while people wait — all they have to do is phone and we'll advise them on their problem. If it turns out that they should come in, and are near enough to do so, we make an appointment and give them a quote as to the repair price. It's up to them whether they wish to proceed.

"There's no shortage of repair companies, but our reputation helps us rather than anything else," he says. "We will bust a gut trying to repair a machine and will never reject one unless the damage is phenomenal."

Bhatt's basic advice goes as follows. "Don't keep anything metallic or liquid on the same surface as the micro, particularly near the Spectrum's rear end, as it could go inside and short-circuit it. Also, keep all the leads tidy as kids playing nearby can easily pull it off the table and wreck it."

Bhatt says repairing it yourself can often result in small hairline cracks in the Spectrum bodywork, and little bubbles of solder can be left behind which fall into the Spectrum's innards making it short-circuit. That will result in lots of problems, so that you won't know what is wrong.

The only micro Mancomp has been unable to take so far is the QL, due to the shortage of spares, although Bhatt has not been short of queries on this machine. At the time of writing, Preston-based distributor CPC was expecting its first big delivery of QL spares which it will distribute to interested third party maintenance companies — just in time for all those QLs coming out of warranty towards the end of the year.

Those based near Coventry may care to try Quantum, at the City Arcade Shop who do all Sinclair repairs including Interface 1, microdrive, ZX-81, 16K RAM pack, Spectrum ZX Printer, Spectrum and QL — once parts are received. Repairs are done on the premises and a Spectrum repair will set you back about £20 including VAT and parts while a ZX-81 repair is £2.50 cheaper.

"If more than £10 worth of spares are necessary, we'll do a written estimate for the customer", says manager Glen Lloyd, who finds that most sick Sinclair machines arrive in the school holidays.

Lloyd is irritated by magazines which teach readers how to build things like interfaces. "Unless you've done a lot of building, you stand a good chance of wrecking your computer," he says. "Some customers think they're experts when they're not. They go around connecting strange things to the Spectrum, like home-made edge connectors."

The culprit, it seems, is that ominous little wafer of plastic that goes vertically down the edge connector. If that bit falls out you can easily stick the plug into the wrong hole.

The machine will be damaged unless it is switched off within seconds — so be warned. "We recommend that you glue the plastic in place to stop this happening," says Lloyd.

Another common problem is the membrane underneath the Spectrum's 'dead flesh' keyboard. That becomes brittle with age and use and is likely to need replacing at some point.

Although the company does not concentrate on education, they do Coventry City Council's repairs and they're popular with US customers too. Users of the old Timex can get it to perform like a Spectrum if they have a Sinclair ROM to go inside, so Quantum do those mail order.

Ishtiaq Hussain at Luton's Chiltern Repair Centre bases his service on 'speed and reliability' — two things he feels Sinclair lacks. "Sinclair would probably charge you more, and our service is quicker," he says. "We turn machines around within three to five days."

That is certainly better than Sinclair's efforts on a 10 working day turnaround system, charging £30 compared with Hussain's £18.

Again, plugging in peripherals

continued on page 64

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continued from page 61

while your Spectrum is on was Hussain's main warning, combined with messing about with your machine.

Meanwhile, if you are stationed in the depths of Norfolk, MP Electronic Services in Dereham is a good bet. A ZX-81 repair is £12.50 including six month's warranty, while Spectrums cost a straight £20 all-in. The company also does modifications to power supplies and ULA circuitry.

"About 50 percent have been damaged by users, by the 'power on' phenomenon. There are lots of memory failures and CPUs getting damaged by users," says service manager Alan Jackson.

The bulk of MP's foreign custom comes from the RAF and WRAF in Germany — they do a lot of work for the forces here, too, so most of the work comes through recommendation.

Having heard more than a few complaints about Sinclair, we turned to them for their comments. Officially, repair time is 10 working days from the date Sinclair receives your burnt/broken offering. Asked about the long delays, spokesman Julian Goldsmith says, "If you consider that there are one and a half million Spectrums in the UK, even if you handle 0.1 percent of them, that's still a lot, especially considering that things get lost in the post etc."

Commenting on independent maintenance companies, he says; "If those people are more local and convenient for people, fine. The only problem is if it's done by people who aren't properly qualified or who use the wrong parts. It's like putting one star petrol in a Rolls Royce."

Goldsmith says he is unaware that people are having problems getting spares for the QL and that "they wouldn't need them anyway," as most are still in warranty.

Although the one year warranty still stands, you will not get your Spectrum replaced by Sinclair after it has gone more than one month into its warranty period, as Sinclair has had problems with users "seeking to get a new machine at the end of its life and generally taking advantage of the return system."

If the hardware has been tampered with in any way during the warranty period, you invalidate the warranty, but the upgrade kit which lets you turn your Spectrum into a Spectrum Plus, by attaching a keyboard, is an exception to that. Goldsmith says Sinclair will do this for you if you do not feel happy about DIY.

Sinclair charges £30 for a Spectrum repair out of warranty and will charge a horrendous £60 for the QL. If you have a bust ZX-81, forget it. "You can buy them for about £20 from Boots or elsewhere so I don't think we'd bother mending it," says Goldsmith.

Video Vault at Glossop, Derbyshire has a computer which checks each micro coming in for repair. Riad Kassar, managing director, says, "We put a connector onto the circuit board of the customer's micro and it reads the board to find the fault. Many customers have messed about with their machines and have put the wrong components in."

"the message is that independent companies are not only faster than Sinclair but cheaper too"

Video Vault turns over 400 machines a week and has a claimed success rate of 95 percent. Not only is it good to find a company which admits it is not 100 percent perfect but it also gives you a free game with your repair so you can test out your Spectrum to see if it has been mended properly. **Jolly Roger,** a graphic adventure worth £6.00, was written by the company and uses all 48K of the Spectrum memory. "We have a thorough checking system and we even put new rubber feet on if they're missing." Cute, eh?

A security seal is put on each machine afterwards so that if it is returned a second time, the company can see whether someone has tampered with it. If the seal is intact, the machine will be repaired again.

Spectrums are fixed for £19.95 inclusive and they do Spectrum Plus upgrades for £30 plus postage and packing. A repair and upgrade is £49.95.

At TV Services in Cambridge, managing director, Ben Done charges £18.75 for Spectrum repairs, £11.50 for ZX-81s and £19.95 for 16K RAM packs. They will also do QL and microdrive repairs once spares are delivered and are happy to repair for foreign users.

Meanwhile, beyond the bracken and heather MicroServ in darkest Denny, Scotland, is doing its stuff. In fact, Sinclair had better watch out if manager Jim Lynch keeps to his expected price for QL repairs — estimated at £20 plus parts, postage and packing, making a likely price of around £30. Spectrums cost £20 and ZX-81s £15 and both prices are inclusive. "We'd give an estimate over the phone but not a definite quote until we'd seen the machine, and there's a three month warranty on each repair." Spectrum repairs take an hour while you wait or 24 hours if posted.

Overall, the message seems to be that independent companies are not only faster than Sinclair but cheaper too, in addition to giving a more personal service.

Users wanting to keep their ZX-81s in good nick will find them useful, and it is worth deciding whether to insure your micro through one of the companies mentioned or take pot luck with one of the other companies. Many advertise in *Sinclair User* and the list below is only a fraction of the outfits in existence.

One reader did have problems with a service company based in Birmingham. After continual problems trying to get his Spectrum fixed by the company, the reader eventually got some joy at Computer-fix instead.

We would like to hear your experiences of such companies first hand, so if you have any comments on the subject, or any friends who have used them, do write to us at *Sinclair User*.

Where to go

Verran Computer-fix Services, Unit 2H & 2J, Albany Park, Frimley, Camberley, Surrey. Tel: 0276-66266

Domestic & General Insurance Company, Swan Court, Mansel Road, London SW19. Tel: 01-946 7777

Mancomp Ltd, Printworks Lane, Levenshulme, Manchester M19 3JP. Tel: 061-224 1888

Quantum, 33 City Arcade, Coventry. Tel: 0203-24632

Chiltern Computer Centre, 76b Dallow Road, Luton, Bedfordshire. Tel: 0582-455684

MP Electronic Services, The Laurels, Wendling, Dereham, Norfolk. Tel: 0362-87327

Video Vault, 140 High Street West, Glossop, Derbyshire. Tel: 045-74-66555

TV Services, Cheston Mill, Frenches Road, Cambridge. Tel: 0223-358366

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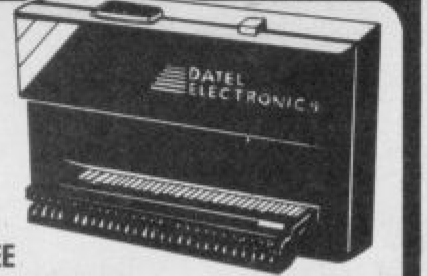
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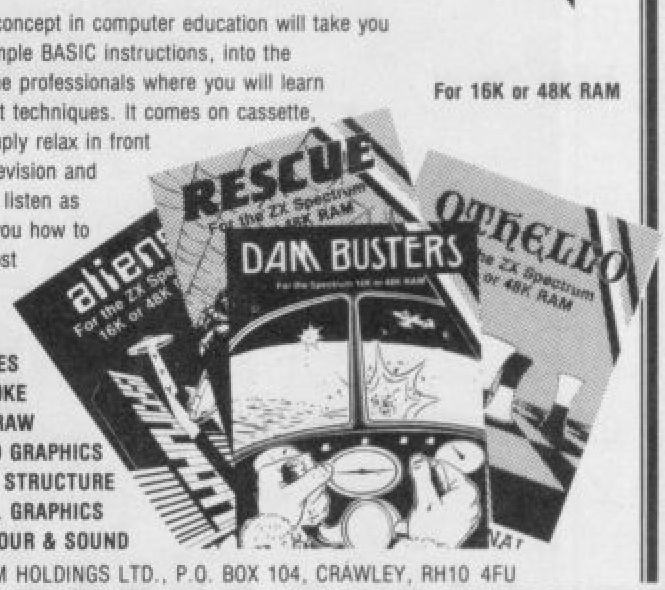
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Stock Manager

THE TEDIOUS business of stocktaking may be at an end with an up-dated program from OCP.

Stock Manager for the 48K Spectrum is designed to keep records of items held in stock and produce invoices. There are now four versions available. The version reviewed here is for the SPDOS disc system.

Compared with a loading time of around four and a half minutes for the cassette versions the SPDOS version is loaded automatically in just over 10 seconds.

The number of stock items handled by the program has also been increased from 600 items to 6300 on the SPDOS version. At extra cost, versions for an 800K disc, handling up to 17550 items, are available.

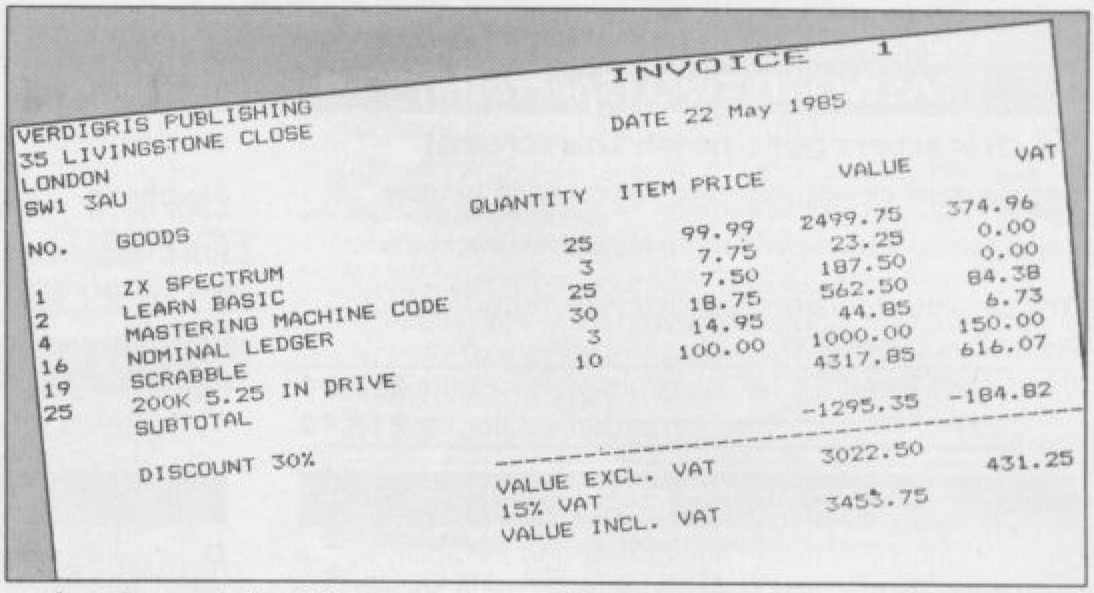
Machine coding provides **Stock Manager** with almost instantaneous retrieval of data from memory. Although only 450 items are held in memory at any one time, details on any item from one to 6300, or even 17550, can be displayed on the screen in under five seconds.

Most printer interfaces for the Spectrum require software to run them. OCP has provided software for 15 interfaces in the program.

When setting up the system the number of the first invoice, the name and address of the company, are entered. Once set up that name cannot be changed but the address can be.

To set up the stock data the amend/change option is selected from the main menu. The stock number, name — up to 25 characters — price excluding VAT, whether VAT is chargeable and the stock level at which items should be recorded, are input.

Unfortunately, a separate option, stock increase, must be used to enter the initial stock levels. A stock decrease option is also given. Those options allow adjustments to be made so that the stock level is accurate.



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DATE 22 May 1985

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16	NOMINAL LEDGER	30	18.75	562.50	84.38
19	SCRABBLE	3	14.95	44.85	6.73
25	200K 5.25 IN DRIVE	10	100.00	1000.00	150.00
	SUBTOTAL			4317.85	616.07
	DISCOUNT 30%			-1295.35	-184.82
	VALUE EXCL. VAT			3022.50	
	15% VAT				431.25
	VALUE INCL. VAT			3453.75	

Both the invoice and price list options print the company name at the top of the paper and its presentation is unusually poor. The items for the invoice are entered by their stock number. An excellent series of error-trapping routines ensures that you can rectify most mistakes.

Unlike some of the other stock control programs available — reviewed in the August '84 issue — the buying-in cost is not used. That is probably the easiest to use and has the advantage of producing invoices.

The SPDOS system, with its faster loading and increased data size, improves an already excellent program. With OCP's backing, SPDOS should become the disc system for business users.

Since this review was written, the SPDOS system has been bought by Kempston and renamed KDOS. It has a tape-disk facility and is compatible with all SPDOS software, including **Stock Manager.**

Mike Wright

Publisher OCP 77a Packhorse Road, Gerrards Cross, Buckinghamshire SL9 8PQ **Price** £19.95
★★★★

Classic Bookkeeping

IF YOU run a small business, you might look at a new accounting system from Manx Tapes.

Classic Book-keeping and Financial Accounts is a 15-program package for a 48K Spectrum, single microdrive and full-sized printer. It is supplied on two microdrive cartridges and a further five cartridges are required for data and interim program storage. If back up cartridges are made then 14 cartridges are necessary to run the system.

The manual is adequate. It does have its weak points and the section on installing the system leaves a great deal to be desired.

The author appears to have been blinkered by the intricacies of book-keeping to the extent that the user is forgotten when it comes to providing the extra touches which make a program easy to use.

The details needed to install the system are contained in four programs. To use a different part of the install option, an error is forced to stop the current program, by using a non-existent second microdrive. You must then reload the system before the install option and the relevant program selected. That also applies to other sections of the system. Very tedious.

Unusually, there is a facility for increasing the amount of data handled. That does not alter the size of the arrays holding the data but alters the variables used to determine how often the system chugs round the loops.

The system keeps three ledgers — general, sales and purchases — and six programs to enter data. Those are cash received, bank payments, petty cash payments, sales journal, purchase journal and journal entries.

Apart from keeping the books the system will also produce account statements for customers which are well laid out with all necessary details.

Although the entry of data into **Classic Book-keeping and Financial Accounts** is relatively easy, the time wasted with large numbers of microdrive cartridges makes it unwieldy.

It is an impressive accounting system which you might prefer not to use but it is one from which you might be only too happy to receive reports.

Mike Wright

Publisher Manx Tapes Garey Veg, Glen Audlyn, Ramsey, Isle of Man **Price** £69.95
★★

more business software on page 72

Thinking software?

THE TASWORD WORD PROCESSORS

The extensive features of the Tasword word processors are ideal for both the home and business user. Every Tasword comes complete with a comprehensive manual and a cassette or disc. The cassette or disc contains your TASWORD and TASWORD TUTOR. This teaches you word processing using TASWORD. Whether you have serious applications or simply want to learn about word processing, TASWORD and TASWORD TUTOR make it easy and enjoyable.

TASWORD TWO (Spectrum)

64 characters per line on the screen!

"Without doubt, the best utility I have reviewed for the Spectrum." HOME COMPUTING WEEKLY APRIL 1984

"If you have been looking for a word processor, then look no further." CRASH JUNE 1984

The cassette program is supplied with instructions for microdrive conversion.

TASWORD TWO* ZX 48K Spectrum — cassette **£13.90**, microdrive cartridge **£15.40**

TASWORD EINSTEIN

A sixty-four character per line display and the ability to hold over five hundred lines of text at any time are just some of the features of this, the most recent of the Taswords. Full interaction with the disc system — e.g. Tasword detects the presence of added drives and allows their use.

TASWORD EINSTEIN Tatung Einstein — disc **£19·95**

TASWORD MSX

With all the features of the Spectrum Tasword Two including the amazing sixty four character per line display. The Tasword MSX machine code program utilises the 32K of memory not normally available to Basic allowing over five hundred lines of text to be held in memory.

TASWORD MSX* 64K MSX Computers
Fully inclusive mail order price **£13·90**
(cassette includes both disc and tape versions)

TASWORD 464

"There is no better justification for buying a 464 than this program." POPULAR COMPUTING WEEKLY NOVEMBER 1984

A particularly sophisticated yet easy to use program. Now available on disc. The cassette version is supplied with instructions for transferring to disc.

TASWORD 464* Amstrad CPC 464 & 664 — cassette **£19·95**, disc **£22·95**

TASWORD 464-D

This is the new Tasword especially developed to utilise the capabilities of the CPC 464 and 664 disc drives. A major new feature is a powerful mail merge facility. Tasword 464-D will only run on, and is only supplied on, disc. ▷

TASWORD 464-D Amstrad CPC 464 & 664 — disc **£24·95**

*Available from larger branches of Boots

THE TASPRINT STYLE WRITERS

A must for dot-matrix printer owners! Print your program output and listings in a choice of five impressive print styles. The Tasprints utilise the graphics capabilities of dot matrix printers to form, with a double pass of the printhead, output in a range of five fonts varying fron. the futuristic Data-Run to the hand writing simulation of Palace Script. A TASPRINT gives your output originality and style! The TASPRINTS drive all Epson compatible eight pin dot-matrix printers, e.g.

EPSON FX-80	NEC PC-8023B-N	BROTHER HR5
EPSON RX-80	MANNESMANN TALLY MT-80	SHINWA CP-80
EPSON MX-80 TYPE III	STAR DMP 501/515	DATAC PANTHER
	COSMOS-80	DATAC PANTHER II

Five impressive print styles for your use:

COMPACTA - bold and heavy, good for emphasis
DATA-RUN - A FUTURISTIC SCRIPT
LECTURA LIGHT - clean and pleasing to read
MEDIAN - a serious business-like script
PALACE SCRIPT - a distinctive flowing font

Typical Tasprint output. Please note that different makes of printer produce different sized output.

TASPRINT (Spectrum)

Drives all the printer interfaces compatible with TASWORD TWO and can be used to print TASWORD TWO text files as well as output from your own Basic programs.

TASPRINT 48K Spectrum — cassette **£9·90**, microdrive cartridge **£11·40**

TASPRINT EINSTEIN

Print TASWORD EINSTEIN text files in one or more of the TASPRINT fonts.

TASPRINT EINSTEIN — disc **£14·95**

TASPRINT QL

TASPRINT QL includes a screen editor used to modify files created by other commercial software, such as QUILL, or by the user from BASIC. These modified files include TASPRINT control characters and may be printed, using TASPRINT, in one or more of the unique TASPRINT fonts.

TASPRINT QL Sinclair QL — microdrive cartridge **£19·95**

TASPRINT 464

Can be used to print AMSWORD/TASWORD 464 text files in addition to output from your own Basic programs. Drives the **Amstrad DMP-1** in addition to the printers listed above.

TASPRINT 464 Amstrad CPC 464 & 664 — cassette **£9·90**, disc **£12·90**

TASWORD UPGRADES

Tasword 464 and Amsword owners: send your original cassette or disc (not the packaging) as proof of purchase. Your original will be returned together with Tasword 464-D on disc. **£13·90**

. . . think Tasman

THE TASCOPY SCREEN COPIERS

The TASCOPY screen copiers print high resolution screen copies with different dot densities and patterns for the various screen colours. This gives the screen copies a shaded effect which presents on a monochrome scale the colours on the screen. With TASCOPY you can keep a permanent and impressive record of your screen pictures and diagrams. TASCOPY supports all the printers mentioned under TASPRINT.

TASCOPY (Spectrum & Interface 1)

The Spectrum TASCOPY is for use with the RS232 output on ZX Interface 1. It produces monochrome copies (in a choice of two sizes) as well as copies with the shaded "grey scale" effect described above.

TASCOPY ZX Spectrum — cassette **£9·90**, microdrive cartridge **£11·40**

TASCOPY QL

TASCOPY QL adds new commands to the QL Superbasic. Execute these commands to print a shaded copy of the screen contents. Print the entire screen or just a specified window. TASCOPY QL also produces large "poster size" screen copies on more than one sheet of paper which can then be cut and joined to make the poster, and high speed small copies.

TASCOPY QL Sinclair QL — microdrive cartridge **£12·90**

TASCOPY 464

Adds two new commands to the 464 Basic to give both a standard shaded screen copy as well as a "poster size" copy which is printed onto two or four sheets which can be cut and joined to make the poster.

TASCOPY 464 Amstrad CPC 464 & 664 — cassette **£9·90**, disc **£12·90**



Available from good software stockists and direct from:

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Leeds LS2 9LN · tel (0532) 438301

Telephone Access/Visa orders: Leeds (0532) 438301

PLUS . . .

TASWIDE The Screen Stretcher

With this machine code utility you can write your own Basic programs that will, with normal PRINT statements, print onto the screen in the compact lettering used by TASWORD TWO. With TASWIDE you can double the information shown on the screen!

TASWIDE ZX 16K + 48K Spectrum **£5·50**

TASMERGE The Mail Merger

Transfer data from MASTERFILE to TASWORD TWO! Letters and forms typed on TASWORD TWO can be printed with addresses and data taken from MASTERFILE. The mail merge facility allows, for example, multiple copies of a letter to be printed, each containing a different name and address taken from your MASTERFILE data. To use TASMERGE you must have one or more microdrives as well as TASWORD TWO and MASTERFILE by Campbell Systems (version 9 or later).

TASMERGE ZX 48K Spectrum **£10·90**

TASMAN PRINTER INTERFACE

Plug into your Spectrum and drive any printer fitted with the Centronics standard parallel interface. Supplied complete with ribbon cable and driving software. The user changeable interface software makes it easy to send control codes to your printer using the method so successfully pioneered with TASWORD TWO. The cassette contains fast machine code high resolution full width SCREEN COPY SOFTWARE for Epson, Mannesmann Tally, Shinwa, Star, and Tandy Colour Graphic (in colour!) printers. TASCOPY, shaded screen copy software for this interface (value £9·90 — see description on left) is included in this package.

CENTRONICS INTERFACE ZX Spectrum **£39·90**

COMPUTER PRINTER CABLES

RS232 for ZX INTERFACE 1	**£14·50**
MSX CENTRONICS	**£8·00**
AMSTRAD CPC 464 CENTRONICS	**£9·90**

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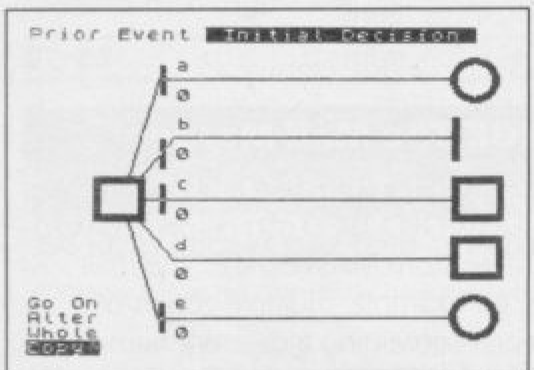
Send me the free Tasman brochure describing your products: ☐ Tick here
I would like to know more about your programs for (please tick):
QL ☐ Tatung Einstein ☐ ZX Spectrum ☐ MSX ☐ Amstrad CPC 464 & 664 ☐

All prices include VAT and packaging.

Decision Maker

IN ANY business a range of mathematical tools can be used to solve problems and help make decisions. **Decision Maker** for the 48K Spectrum is one such tool.

It is designed to give an understanding of the concepts of decision analysis, and then to allow those concepts to be put into practice.



Decision analysis is a technique used for solving problems in which decisions have to be made. It involves constructing a diagram showing the outcome of each decision and its relationship to the original decision.

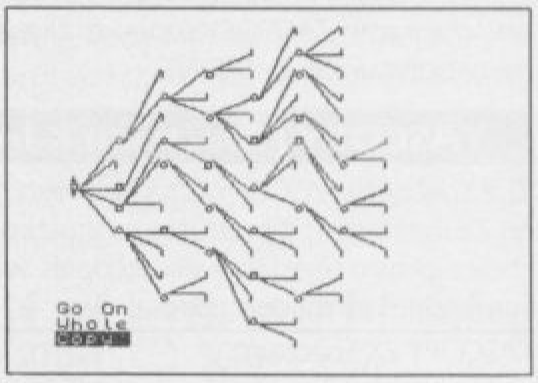
The package consists of a teaching cassette, an applications cassette and a manual. Only one of the 12 chapters is devoted to running the applications program. That one chapter is the driest of them all.

The teaching cassette contains 10 programs, each designed to be used in conjunction with a chapter of the manual.

Each program deals with a particular aspect and usually includes a selection of multiple choice questions at the end. Before you move onto the next program an analysis of your performance is displayed with the option of running through the questions again. At times the questions repeat themselves with monotonous regularity.

The applications program allows you to build up a decision tree, starting from a first decision. At each decision the number of outcomes is entered, followed by the name, value and, if it is subject to chance, the probability for each outcome in turn. The tree has a maximum of 150 decisions and five outcomes for each decision. A useful feature — chain — allows part of the structure to be repeated without retyping. The whole tree, minus details, can be shown on the screen. An excellent range of editing facilities allows the data to be changed at almost any stage.

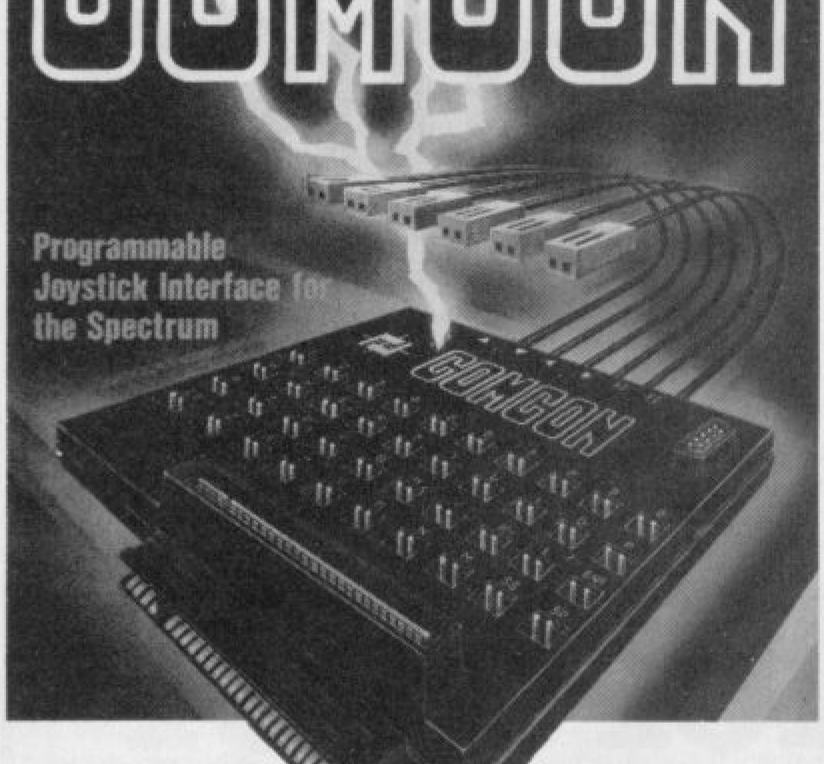
As you are unable to examine any decision other than the first from the main menu detailed study becomes tedious. Unless you are extremely adept at analysing the structure of those problems in your head, you need to outline the tree on paper before entering the details. Fortunately, the speed of the calculations for even a medium-size tree makes it worthwhile.



Mike Wright

Publisher Collins Soft, 8 Grafton Street, London W1X 3LA
Memory 48K **Price** £14.95
★★★

COMCON



Simple and fast programming: Plug the six function connectors into the required Spectrum key positions – Ready!

Supports joysticks with two independent fire actions: Photon Blasters and Neutron Bombs at the touch of your fingertips.

Extension port for combined use of peripherals.

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Compatible with all Atari-type joysticks including Quickshot II (without rapid fire action).

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Two port version allows connection of two joysticks for sequential two player games using same key positions (non- independent!)

QUICKSHOT 2+2 JOYSTICK — **£13.95** incl.VAT and P&P
modified to incorporate 2 independent fire actions and no rapid fire option

FLIGHTLINK HOTSHOT JOYSTICK — **£10.50** incl. VAT and P&P
with two independent fire actions

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fits into COMCON extension slot

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ZX SPECTRUM PRINTER INTERFACE

"One of the most comprehensive printer interfaces available for the Spectrum. With a choice of both Centronics and RS232 in the one interface it will satisfy most." (SINCLAIR USER MAGAZINE).
"A remarkable device which packs considerable ingenuity into a small box. Should be almost irresistable." (COMPUTING TODAY)
"I will keep looking for the perfect interface but in the meantime I'll use the next best thing – ZXLprint III." (ZX COMPUTING)

£34.95 cable £9.95 inc. VAT



ZXLprint III interface enables your Spectrum computer (16 or 48K) to print on almost any dot matrix or daisy wheel printer with RS232 or Centronics input. Just plug in ZXLprint III and LPRINT and LLIST commands will work. COPY works without any software on Epson, Star Delta, Brother HR5 & 1009, Gemini, Walters WM80, Mannesman MT80, Kaga Taxan, Cannon, Shinwa, Seikosha 100, 250 & 500. Plus Seikosha GP700 in FULL COLOUR. Also available is optional COPY in 4 colours on CGP115, MCP40 & 80 and SCP80.
No additional software needed – RAM is free to take Tasword 2, Masterfile, OCP +80 software, Kemp Business Accounts etc.

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All aboard for Mars

EVERYONE with a QL dreams of doing something useful with it but if you cannot, then you can always pretend you are doing something useful. That is a fairly accurate description of what Patrick J Hall is doing in *The Real Thing? Microcomputer Simulations on the Sinclair QL*.



The book is packed with practical simulation programs which take those who are willing to type them in, into the heart of the human circulatory system, into a gas turbine and on a trip to Mars.

The simulations are split into three categories which deal with processes, the evolution of natural forces and the planning of human endeavours. The programs use the full graphics and numeric capabilities of the QL. They can be used just for fun or for getting ideas for your own simulations.

The programs also have a more practical educational use. For instance, the gas turbine, steller evolution and design of a reservoir could be used in school or college classes. Who knows, the town planning simulation could even be used by councils.

The descriptions of the programs, which are split up into SuperBasic procedures for easy reference and understanding, together with explanations of techniques, makes fascinating reading.

There is probably more in Hall's book about programming the QL than in most of the other books on SuperBasic put together. Hall not only knows his subject but has the rare knack of leading you at a steady pace through complex programming techniques without talking down to you.

While educationalists should jump at the chance to get hold of a copy, the home user will also benefit from Hall's wide experience on the QL. *John Gilbert*

The Real Thing?
Publisher Sigma
Price £7.95

Get less from your Epson printer

AS THE flyleaf of Susan Curran's book *Get more from the Epson Printer* points out, for many microcomputer users a printer is a major purchase. Unfortunately, this work fails to live up to the promise of its title.

The author cannot be faulted on the decision to concentrate on the Epson range.

The book falls down in that it fails to offer much practical advice on just how you may exploit the full power of your printer. QL owners will find some advice on how dot matrix printers may be used in conjunction with the four Psion packages bundled with the computer. The details provided, though, are in no more depth than those to be found in many other publications dealing with the QL. There is no information concerning the Spectrum which may be used in conjunction with any of the printers from the Epson range.

Perhaps the weakness of the work is best illustrated by the section on user defined characters. While the author shows how you may go about defining an alternate character set, in a more understandable fashion than the manual accompanying a printer such as the FX80, that is as far as she goes. It could be expected that the book would offer a few character sets of its own.

A disappointing book which provides little information beyond that to be found in the documentation provided with the QL and printers from the Epson range. *Gary Evans*

Get more from the Epson Printer
Publisher Collins
Price £7.95 (paperback)

Books for beginners

KELLY TEMPLE is presenter of *XYZ On Air* for Capital Radio, a programme dedicated to computers. He admits he is a beginner and his book, *Capital Radio's Book of Computers and Simple Programming* is aimed at beginners and is non-machine specific.

Twenty five pages are devoted to details of home computers. The main bulk concentrates on all the familiar features of Basic. There is nothing to recommend the book to owners of the *Spectrum User Guide*.

The *Spectrum Data Log* is a workbook intended for beginners, but tackles the subject in a different way. As captain of the Starship Questar the reader is led through a series of exercises covering the main commands in Spectrum Basic.

You are encouraged to write out the programs in the workbook in the spaces provided and design the graphics on the squared spaces provided. *Spectrum Data Log* is an interesting approach for young beginners. *Theo Wood*

Capital Radio's Book of Computers and Simple Programming
Publisher Interface Publications **Price** £3.95
Spectrum Data Log
Publisher Collins
Price £2.00

Learning the hard way

CHRISTOPHER Leigh's book *Starting Logo* is based on the program **Spectrum Graphics Logo** also published by Sigma at £17.95.

Spectrum Graphics Logo is a graphic subset of the language without the list handling capabilities of **Sinclair Logo**. It comes with a keyboard overlay which allows commands to be ENTERed by the use of single keys.

There is one glaring fault which overrides any other consideration. There is no way you can SAVE Logo procedures onto tape or microdrive. The only way to obtain a record is by printing them out on a printer. All very well for owners who have one, though it is frustrating to work on programs and have to type them in later for revision.

For that reason both packages are not worth purchasing. *Theo Wood*

Starting Logo
Price £6.95
Spectrum Logo Graphics
Publisher Sigma Press
Price £17.95 **Memory** 48K

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A powerful programmer with Fast and Smart programming software in firmware. For 2764/128 & 'A' types, usable in ROM cartridge for you own utilities etc. CHECK, READ CRC, BLOW & VERIFY, past or all EPROM — £69.95

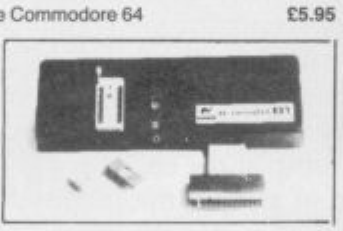
Q-CART ROM — **reader for QL**
Takes 2764 or 27128 — £5.95

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```
STATUS      NO OF SYSTEM  —HEX
             EPROM TYPE   —27128
         RAM START ADDR   —4000
        EPROM ST ADDR     — 0000
             JOB LENGTH   — 4000
                   TASK   — CHECK
-----------------------------------
     WHICH TASK DO YOU WISH TO DO
W) CHECK THAT EPROM IS CLEAN
X) READ THE CONTENTS OF EPROM INTO
   RAM
Y) BLOW AN EPROM WITH DATA FROM
   RAM
Z) VERIFY THAT EPROM DATA IS THE SAME
   AS IN RAM
Q TO QUIT                 R TO RESTART
— — — — — — — —
        FAST CODES AVAILABLE
   D      H      PQR      WXYZ
```



AT LAST!
For the Spectrum user. Put you programs, utilities, Assemblers into EPROMs for instant load from the unique ROM-SP.

ROM-SP — **for Spectrum**
Ingenious unit for Spectrum, with 2×28 pin sockets and a Reset button allows up to 16K of Basic or M/C program to RUN or LOAD instantly from EPROMs. Cabled connector and full extender card. NOTE: Does not disable Sinclair ROM — £29.95

PROMER-SP — **for Spectrum**
An economical Spectrum programmer for 2764/128. Zero insertion force socket & software on tape — £29.95

PROMER 81-S
The very popular ZX81 programmer for 1761/32 EPROMs has been adapted to the Spectrum and the price is kept low — £24.95

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NiCd battery back-up for Spectrum ZX81/ATMOS — £17.35

DREAM-81 — **for ZX81**
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4K CMOS RAM with lithium battery. Easy SAVEing, 10yr storage and instant retrieval of programs — £22.95

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O'LEVELS

not just revision but also tuition for the Spectrum 48K

Mathematics 8 programs TOTAL 150K	Fractions, square roots, decimals, logarithms, areas, sets, accuracy, bases, interest, volumes, indices, standard form, modulo, number set, pie charts, histograms, simultaneous equations, bar charts, averages, probability, algebraic laws, quadratics, matrices, vectors, transformational geometry, trigometry, differentiation, integration, factors, angles.
Physics 7 programs TOTAL 140K	Reflection, wavelength and frequency, refraction, lenses, the eye and its defects, diffraction, colour, magnetism, motors, Ohm's law, amps, volts, series, parallel, electronics, heat, gas laws, energy forms, specific heat, kinetic energy, half-lives, atomic structure, radiation, isotopes, Newton's laws.
Biology 6 programs TOTAL 120K	Plant and animal cells, genetics, inheritance, reproduction in man, asexual and sexual reproduction, flowering plants, photosynthesis, osmosis, transpiration, transport, bacteria food classes, diet, alimentary canal, respiration, excretion, eye, skin, nervous system, ecosystem, food cycles, fungi, earthworm, amphibians, birds, mammals, response.
Computer Studies 7 programs TOTAL 140K	Data collection, coding, storage, processing, presentation, validation, d.p. systems, privcy, security, hardware, I/O devices, software, low and high level languages, machine-code, assemblers, interpreters, compilers, errors in programming, aids to debugging, microcode, machine organisation.
Chemistry 8 programs TOTAL 150K	Matter states, action of heat and electricity, rection with air, water, acids alkalis, halogens, oxygen, sulphur, nitrogen, phosphorus, carbon, hydrogen, alkali metals, alkaline earth metals, transition metals, organic chemistry, atoms, formulae, molar mass, equations, ions, periodic table, bonding, gases, metal extraction, polymers, fertilizers.
French 8 programs TOTAL 160K	Regular and irregular verbs, reflexives, indicative, subjective, passive, infinitive, agreement, pronouns, definate, indefinate and partitive articles, single and compound nouns, adjectives and their forms, adverb phrases, comparatives and superlatives, conjunctions, prepositions, idioms, measurements.
Electronics 8 programs TOTAL 150K	Energy and its sources, power distribution, e.m.f. p.d., charge, current power, r.m.s. values, resistors, series and parallel, capacitors, time constants, inductors, transformers, resonance, microphones, loudspeakers, heat and light sensitive devices, diodes transistors, logic circuits, multivibrators, meters, CRO, amplifiers, feedback.

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English Language 8 programs TOTAL 160K	Composition, Narration, description, discursion, letterform, transaction, expression, emphasis, sentence construction, paragraph, punctuation, agument, awareness of context, idioms, inference, summarising.
German 8 programs TOTAL 160K	Strong, weak, reflexive and mixed verbs, singular and plural, indicative active and passive, subjectives, imperatives, infinitives, accusative and dative, articles, nouns, pronouns, adjectives, adverbs, conjunctions, prepositions, numbers, time, quantity, idioms, word order.
Economics 8 programs TOTAL 180K	Price level forces, changes in output, employment and growth, revenue and expenditure, financial institutions, international trading, population and its structure, market forces, supply and demand, price formation, industrial location, scale and forms of enterprise, mixed economy.

LOGO, FORTH PASCAL & C

1 program Each 30K	Teaching versions of these languages, including a full text editor (screen editor) and a 48 page tutorial manual. Saving and loading of programs is a screen editor function. Trace facilities are provided for easy tuition and debugging. Availability: Pascal now, C now, Logo soon, Forth soon.

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PROGRAM PRINTOUT

GRAPHICS INSTRUCTIONS

IN GENERAL, graphics abbreviations are enclosed in brackets, which should not be entered. A string of the same graphics character is represented in the form (3*A) which would be entered as AAA, where A is the graphics character. A space, where it is important to have the correct number of spaces, is indicated by (sp). Spaces in text will not normally be indicated. Where several graphics characters are used, they are separated by commas, which should not be entered. With Spectrum and QL listings the letter l has a flat top and the numeral 1 has a sloping top.

The above applies to all Sinclair machines. The following instructions are for specific machines.

ZX-81: ZX-81 listings are generally reproduced as they appear when you enter them, spaces and all. Where extensive graphics are used, REM statements will be inserted to provide a guide to the position of each character.

Spectrum: User-defined graphics are represented by underlined letters, without brackets. Type the appropriate letter while in graphics mode. The underline does not appear on the screen. Inverse characters have the letter i before them, e.g. iZ, iA, iP. Block graphic characters are indicated by g followed by the number of the appropriate key: g4 would mean the block graphics on key 4, ig4 the inverse of that graphic.

Control codes are indicated by cc before the character, and are obtained by pressing CAPS SHIFT while in extended mode. They do not appear on the screen but may change the colour of the cursor and will affect what is printed after them: cc3,i* would thus have the effect of printing an inverse asterisk in red.

QL: User-defined graphics on the QL are indicated by a description of the keys pressed to obtain them, underlined and in brackets. Thus (CTRL + 9) means press CTRL and 9 together. The same applies for unusual characters within the QL character set, which our printer is unable to reproduce.



shopkeeper

BE YOUR OWN street-corner capitalist in **Shopkeeper** by L N Langley of Bury St Edmunds, Suffolk. The game runs on a 48K Spectrum or Spectrum Plus, and sets you the task of running a corner shop for a year. You must choose from a large range of goods in stock, and take weather and holidays into account. Those factors can also affect your advertising strategies.

Experienced programmers should find it easy to alter the parameters for various products if they desire, and add extra random events and hazards with ease.

```
  10 PAPER 6: BORDER 2: INK 0: F
LASH 0: BRIGHT 0: OVER 0: INVERS
E 0: CLS
  15 PRINT AT 0,11; INVERSE 1;"S
HOPKEEPER"'
  20 PRINT "  You are a prospect
ive           shopkeeper. You have
 to set up  your shop and try to
 run it for a year. You lose if
you go        bankrupt or if you t
ake less      than £100 in any wee
k."
  30 PRINT "  When answering a q
uestion typein the answer in low
ercase."
  40 PRINT "  When ordering, sel
ect the itemby typing in the cha
racter        indicated in the far
 left hand  column. Then follow
the           instructions and ent
er the        amount of the item y
ou wish to  order."
  50 PRINT "  Remember to take t
he weather  and the time of year
 in to        account when orderin
g.Certain   things sell well at
certain       times. Others sell a
ccording to the weather. Some do
n't sell!"
  60 PRINT#1;AT 1,10;"PRESS ANY
 KEY"
  70 PAUSE 0
  80 CLS : PRINT "  Also remembe
r to take the timeof the year an
d the weather intoaccount when c
hoosing your        advertised pro
ducts."
 100 PRINT #1;AT 1,10;"PRESS ANY
 KEY"
 105 PAUSE 0: CLS
 109 REM *******YOUR CASH*******
 110 PRINT "You have decided to
run a shop. You will operate it
for one yearand try to make a pr
ofit in a   very tough business"
''
 111 PAUSE 500
 120 LET cash=200+INT (RND*801)
 130 PRINT "You have dug out all
 your life  savings for this bus
iness         venture. You have £"
;cash''
 131 PAUSE 400
 140 IF cash<400 THEN  LET a$="Y
ou had better work hard or elsey
ou will go bankrupt with such  l
ittle money"
 150 IF cash>400 THEN  LET a$="T
his is a fair amount of money  t
o set up your shop with"
 160 IF cash>800 THEN  LET a$="W
ell done! You must have saved  w
ell to have this much money"
 170 PRINT a$''
 171 PAUSE 250
 174  PRINT "Now is the time to
decide         whether you want a
loan or not"''
 176 INPUT "Do you want a loan?
(y/n) ";l$
 177 IF l$="n" OR l$="N" THEN  G
O TO 400
 178 IF l$<>"y" OR l$="Y" THEN
GO TO 176
 179 REM *******GET LOAN********
 180 PRINT "In your town there a
re 2 banks. One is Barclay's. Th
e other is  Lloyd's. Lloyd's cha
rges less   interest on loans bu
t have a    surcharge of £50 on
every loan. Barclay's does not"'
'
 190 INPUT "Which bank would you
 like to geta loan from? (b/l)";
b$
 200 LET loan=1500+INT (RND*1001
)
 210 LET interest=(50+INT (RND*1
10))/10
 220 IF b$="L" OR b$="l" THEN  G
O TO 300
 230 IF b$<>"B" AND b$<>"b" THEN
  GO TO 190
 240 PRINT "You have decided to
visit         Barclay's bank"''
 241 PAUSE 200
 250 LET payments=INT (loan*(int
erest/100+1)/13)
 260 PRINT "The bank manager dec
ides to giveyou a loan of £";loa
n''
 261 PAUSE 250
 270 PRINT "The rate of interest
 is ";interest;"%"''
 271 PAUSE 250
 280 PRINT "Every 4 weeks you wi
ll have to  pay a repayment of £
";payments''
 281 PAUSE 300
 290 GO TO 390
```

continued on page 78



```
 300 PRINT "You have decided to
visit        Lloyd's bank"''
 301 PAUSE 250
 310 LET interest=interest-2
 320 LET payments=INT (loan*(int
erest/100+1)/13)
 330 PRINT "To get a loan off Ll
oyd's bank  you have to pay £50"
''
 331 PAUSE 300
 340 LET cash=cash-50
 350 PRINT "This means you now h
ave £";cash''
 351 PAUSE 250
 360 PRINT "The Lloyd's bank man
ager wishes you luck and loans y
ou £";loan''
 361 PAUSE 500
 370 PRINT "The rate of interest
 is ";interest;"%"''
 371 PAUSE 250
 380 PRINT "Every 4 weeks you wi
ll have to  pay a repayment of £
";payments''
 381 PAUSE 400
 390 LET cash=cash+loan
 400 PRINT "You now have all the
 money you  will get to run your
 shop. You  have £";cash''
 401 PAUSE 400
 409  REM *********GET SHOP*****
*
 410 PRINT "It is possible to re
nt some      premises or to buy a
 shop        yourself"''
 411 PAUSE 350
 420 INPUT "Do you want to rent
or buy?  (r/b) ";s$
 430 LET a$="Shop 1 is small and
 is cheap to rent or buy. It is
down a narrowminor road"
 440 LET b$="Shop 2 is a very la
rge store. Ithas a reasonable re
nt or price. It is down an old d
isused side  street."
 450 LET c$="Shop 3 is a reasona
bly sized    store. It has a ver
y high rent  or price. It is on
the corner ofa crossroads"
 460 IF s$="r" OR s$="R" THEN  G
O TO 590
 470 IF s$<>"b" OR s$="B" THEN
GO TO 420
 480 PRINT "Which one of these s
ites do you wish to buy?"''
 481 PAUSE 250
 490 LET a=INT (RND*100+450): PR
INT a$''"£";a''
 491 PAUSE 750
 500 LET b=INT (RND*210+550): PR
INT b$''"£";b''
 501 PAUSE 750
 510 LET c=INT (RND*400+700): PR
INT c$''"£";c''
 511 PAUSE 750
 520 INPUT "Shop number? ";s
 530 IF s=1 THEN  LET cash=cash-
a: PRINT "You have paid £";a;" f
or the       smallest shop"''
 531 PAUSE 250
 540 IF s=2 THEN  LET cash=cash-
b: PRINT "You have paid £";b;" f
or the       largest shop"''
 541 PAUSE 250
 550 IF s=3 THEN  LET cash=cash-
c: PRINT "You have a well placed
 shop at aprice of £";c''
 551 PAUSE 250
 560 PRINT "After paying for you
r shop you  have £";cash''
 561 PAUSE 250
 570 PRINT "You are given the ke
ys to your  new shop and are ple
ased with it"''
 571 PAUSE 300
 580 GO TO 690
 590 PRINT "Which one of these p
remises      would you like to re
nt? (prices per week)"''
 591 PAUSE 300
 600  LET a=INT (RND*4+10): PRIN
T a$''"£";a''
 601 PAUSE 500
 610 LET b=INT (RND*6+12): PRINT
 b$''"£";b''
 611 PAUSE 500
 620 LET c=INT (RND*8+15): PRINT
 c$''"£";c''
 621 PAUSE 500
 630 INPUT "Shop number? ";s
 640 IF s=1 THEN  LET rent=a: PR
INT "You rent the smallest shop"
''
 641 PAUSE 250
 650 IF s=2 THEN  LET rent=b: PR
INT "You rent the largest store"
''
 651 PAUSE 250
 660 IF s=3 THEN  LET rent=c: PR
INT "YOu rent the well placed sh
op"''
 661 PAUSE 250
 670 PRINT "The amount of rent y
ou pay per  week for your shop i
s £";rent''
 671 PAUSE 250
 680 PRINT "After having been gi
ven the keysto the shop and visi
ted it, you believe you have a b
argain"''
 681 PAUSE 500
 689 REM *****BUY EQUIPMENT*****
 690 LET till=INT (RND*30+50)
 700 LET shelves=INT (RND*20+40)
 710 LET counter=INT (RND*5+20)
 720 PRINT "You have to buy a ti
ll @ £";till''
 721 PAUSE 200
 730 PRINT "You have to buy some
 shelves @  £";shelves''
 731 PAUSE 250
 740 PRINT "You have to buy a co
unter @ £";counter''
 741 PAUSE 250
 750 LET cash=cash-counter-shelv
es-till
 760 PRINT "After buying these t
hings you   have £";cash''
 761 PAUSE 250
 769 REM *****GET INSURANCE*****
 770 LET insurance=(INT (RND*5+1
0))*10
 780 PRINT "An insurance company
 sees that  you are setting up a
 shop and   offer you insurance
against     major theft and fire
. The cost  is £";insurance''
 781 PAUSE 750
 790 INPUT "Do you accept the of
fer? (y/n) ";i$
 800 IF i$="y" THEN  LET cash=ca
sh-insurance: GO TO 830
 810 IF i$="n" THEN  GO TO 840
 820 GO TO 790
 830 PRINT "After paying for the
 insurance  you have £";cash''
 831 PAUSE 300
 840 PRINT "You are now ready to
 start       running your store"'

 841 PAUSE 300
 845 BORDER 1
 850 CLS
 860 DIM z$(34,10)
 870 FOR f=1 TO 34
 880 READ z$(f)
 890 NEXT f
1000  DATA "alcohol","tobacco","
chocolate","ice creams","lollies
","sweets"
1010 DATA "beef","pork","lamb","
poultry","tin veg","fresh veg","
fruits","cereals","milk","bread"
,"biscuits","squash","lemonade"
1020 DATA "washpowder","washliqu
id","soap","shampoo","tissues","
loo rolls"
1030 DATA "newspapers","pens","p
aper","cards","plants","toys","p
olish","raincoats","umbrellas"
1040 DIM z(34)
1050 DIM p(34)
1055 REM ***********************
1060 FOR f=1 TO 34
1070 READ p(f): LET p(f)=p(f)/10
0
1080 NEXT f
1090 DATA 39,41,17,22,10,5
1100 DATA 129,99,132,89,21,23,13
,41,20,31,25,19,15
1110 DATA 100,56,29,39,22,9
1120 DATA 15,5,3,12,25,150,99,21
0,126
1130 CLS
1140 FOR w=1 TO 52
1150 PRINT TAB 10; INK 2;"WEEK "
;w
1160 IF w=16 OR w=17 THEN  PRINT
 "Easter is arriving within 2
 weeks"''
1170 IF w>28 AND w<37 THEN  PRIN
T "It is the school holidays"''
1180 IF w<52 AND w>46 THEN  PRIN
T "Christmas is approaching fast
"''
1185 PAUSE 250
1190 IF w<5 THEN  PRINT "It is v
ery cold weather and it  is snow
```




```
ing fast"'': LET rain=1: GO TO 1
240
1200 IF w>20 AND w<30 AND w<>26
THEN  PRINT "It is hot sticky we
ather in yourarea.It is the heig
ht of summer"'': GO TO 1250
1210 IF RND<.2 THEN  PRINT "What
 a week.It is raining cats  and
dogs and everywhere is        floo
ded"'': LET rain=1: GO TO 1250
1220 IF RND>.7 THEN  PRINT "This
 week is good fine weather"'': G
O TO 1250
1230 PRINT "This week is just an
 ordinary   week with average Br
itish       weather"''
1240 LET rain=0
1245 REM ************************
1250 PAUSE 300
1251 PRINT "It is time for you t
o fill this week's order in.Just
 type in theamount of each produ
ct that you require"''
1252 PAUSE 750
1255 CLS
1260 LET y$="Input the letter of
 any item youneed & then follow
instructions"
1262 PRINT y$
1265 PRINT AT 3,9; INVERSE 1;"CO
NFECTIONARY"
1270 LET AAA=1
1275 LET BBB=6
1280 GO SUB 5000
1285 CLS : PRINT y$
1290 PRINT AT 3,11; INVERSE 1;"G
ROCERIES"
1295 LET aaa=7
1300 LET bbb=19
1310 GO SUB 5000
1315 CLS : PRINT y$
1320 PRINT AT 3,11; INVERSE 1;"T
OILETRIES"
1325 LET AAA=20
1330 LET BBB=25
1335 GO SUB 5000
1340 CLS : PRINT Y$
1345 PRINT AT 3,9; INVERSE 1;"MI
SCELLANIOUS"
1350 LET AAA=26
1355 LET BBB=34
1356 GO SUB 5000
1357 CLS
1360 PRINT "Your order is now fi
nished"'': GO TO 1380
1361 PAUSE 250
1370 CLS : PRINT "You are out of
 money in your      account to ord
er any more goods so you will ha
ve to do without  any more thing
s that you          intended to or
der"''
1371 PAUSE 500
1375 REM ************************
1380 PRINT "You have room outsid
e your shop to do an advertising
 display for2 of your products"'

1381 PAUSE 350
1390 INPUT "1st advertised produ
ct "'j$
1400 LET c$="          "
1410 LET j$=j$+c$( TO 10-LEN j$)
1420 FOR f=1 TO 34
1430 IF j$=z$(f) THEN  GO TO 146
0
1440 NEXT f
1450 GO TO 1390
1460 INPUT "2nd advertised produ
ct "'k$
1470 LET k$=k$+c$( TO 10-LEN k$)
1480 FOR f=1 TO 34
1490 IF k$=z$(f) THEN GO TO 152 0
1500 NEXT f
1510 GO TO 1460
1520 BORDER 4: CLS
1525 REM ************************
1530  PRINT "Please wait while I
 work out howmuch of each of you
r products    were sold this week
 and how muchmoney you made from
 their sales"''
1531 PAUSE 500
1540 LET takings=0
1545 PRINT  PAPER 2; INK 7;'"ITE
M      PRICE NO.SOLD RECEIPTS"
1550 FOR f=1 TO 34
1560 IF f<7 THEN  LET t=INT (RND
*25)
1570 IF f>6 AND f<11 THEN  LET t
=INT (RND*10)
1580 IF f>10 AND f<20 THEN  LET
t=INT (RND*30)
1590 IF f>19 AND f<26 THEN  LET
t=INT (RND*24)
1600 IF f>25 THEN  LET t=INT (RN
D*12)
1605 IF f>32 THEN  LET t=INT (RN
D*20)
1610 IF z(f)=0 THEN  LET t=0: GO
 TO 1735
1625 IF z$(f)=j$ OR z$(f)=k$ THE
N  LET t=t*2
1630 IF t>z(f) THEN  LET t=z(f)
1640 IF w=16 OR w=17 THEN  IF f=
3 OR f=29 THEN  LET t=INT (t*2.5
)
1650 IF w>28 AND w<37 THEN  IF f
=6 OR f=19 OR f=4 OR f=5 THEN  L
ET t=t*2
1660  IF w<5 THEN  IF f=24 THEN
 LET t=t*2
1670 IF w>20 AND w<30 AND w<>26
THEN  IF f=4 OR f=5 OR f=18 THEN
  LET t=t*2
1680 IF f<35 AND f>32 THEN  LET
t=t*(3 AND rain=1)*(0 AND rain=0
)
1690 IF w<52 AND w>46 THEN  IF f
=1 OR f=10 OR f=13 OR f=29 OR f=
31 THEN  LET t=t*3
1700 IF s=3 THEN  LET t=t+10
1710 IF s=1 THEN  LET t=t+5
1715  LET t=t*3
1720 IF t>z(f) THEN  LET t=z(f)
1725 IF (f=23 OR f=22 OR f=32 OR
 f=12 OR f=30) AND RND<.9 THEN
LET t=0
1727 IF (f=4 OR f=5) AND w>8 AND
 w<44 THEN  LET t=0
1735 LET psale=(INT (p(f)*115))/
100
1737 LET receipts=psale*t
1739 LET takings=takings+receipt
s
1740 LET z(f)=z(f)-t
1750 PRINT z$(f);TAB 11;psale;TA
B 19;t;TAB 24;receipts
1759 NEXT f
1760 PRINT '"This week you took
£";takings''
1761 PAUSE 200
1765 LET cash=cash+takings
1770 PRINT "This means you now h
ave £";cash''
1771 PAUSE 200
1772 BORDER 1: CLS
1775 REM ************************
1790 IF takings<100 THEN  GO TO
6000
1800 PRINT "You now take out you
r wages of  £100"''
1810 LET cash=cash-100
1820 PRINT "After taking out you
r wages you have £";cash''
1821 PAUSE 200
1825 REM ************************
1830 IF s$="b" THEN  GO TO 1870
1840 PRINT "You have to pay the
rent for     your premises for th
is week      which is £";rent''
1841 PAUSE 350
1850 LET cash=cash-rent
1855 IF cash<0 THEN  GO TO 3040
1860 PRINT "After paying your re
nt you have £";cash''
1861 PAUSE 200
1865 REM ************************
1870 IF l$="n" THEN  GO TO 1930
1880 IF w/4=INT (w/4) THEN  GO T
O 1900
1890 GO TO 1930
1900 PRINT "It is the end of the
 month and  you must pay a repay
ment of yourloan of £";payments"
1901 PAUSE 200
1910 LET cash=cash-payments
1920 PRINT "After paying the loa
n repayment you have £";cash''
1921 PAUSE 200
1925 REM ************************
1930 IF RND>.2 THEN  GO TO 2610
1940 LET disaster=INT (RND*6)
1950 IF disaster=5 THEN  GO TO 2
490
1960 IF disaster=4 THEN  GO TO 2
410
1970 IF disaster=3 THEN  GO TO 2
370
1980 IF disaster=2 THEN  GO TO 2
240
1990 IF disaster=1 THEN  GO TO 2
100
1995 REM ************************
2000 PRINT "A crafty sales repre
sentative  brings some children
s toys into your shop. He says y
ou can buy  them for 50p each an
```

continued on page 80

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```
d sell them at an enormous profi
t of £1.50"''
2010 INPUT "Do you buy any (y/n)
 ";d$
2020 IF d$="n" THEN  PRINT "You
refuse his offer"'': PAUSE 150:
GO TO 2950
2030  IF d$<>"y" THEN  GO TO 201
0
2040 INPUT "How many do you want
 to buy ";nu
2050 PRINT "You buy ";nu;" of th
e rep's toys"''
2051 PAUSE 150
2060 PRINT "All of the toys turn
 out to be  dangerous so you can
not possiblysell them. You lose
£";.5*nu
2061 PAUSE 400
2070 LET cash=cash-.5*nu
2080 PRINT "As a result of your
rash act younow have only £";cas
h''
2081 PAUSE 200
2090 GO TO 2950
2095 REM ***********************
2100 PRINT "A fire rages overnig
ht in your  store. The firemen s
ave the      building but all of
your goods  are lost"''
2101 PAUSE 500
2110 IF i$="n" THEN  GO TO 2200
2120 IF i$="y" THEN  PRINT "You
were a wise person in takingthe
insurance man's offer"''
2121 PAUSE 200
2130 LET cover=0
2140 FOR f=1 TO 34
2150 LET cover=cover+z(f)*p(f)
2160 NEXT f
2170 DIM z(34)
2180 PRINT "The insurance firm p
ays for all the damages. You get
£";cover'': LET cash=cash+cover
2185 PAUSE 200
2190 GO TO 2950
2200 PRINT "You had no insurance
 cover and  so you lost all your
 ggods and  get no compensation"
''
2201 PAUSE 300
2220 DIM z(34)
2230 GO TO 2950
2235 REM ***********************
2240 PRINT "During the night a b
unch of     organised criminals
steal all ofyour goods"''
2241 PAUSE 300
2250 IF i$="n" THEN  GO TO 2340
2260 PRINT "You were a clever pe
rson to     invest in some insur
ance cover"''
2261 PAUSE 200
2270 LET cover=0
2280 FOR f=1 TO 34
2290 LET cover=cover+z(f)*p(f)
2300 NEXT f
2310 DIM z(34)
2320 PRINT "The insurance firm p
ays for all your losses. You get
£";cover'': LET cash=cash+cover
2321 PAUSE 250
2330 GO TO 2950
2340 PRINT "You had no insurance
 cover and  get no compensation"
''
2341 PAUSE 200
2350 DIM z(34)
2360 GO TO 2950
2365 REM ***********************
2370 PRINT "Some children take a
 fancy to   your sweets and stea
l the lot"''
2371 PAUSE 200
2380 PRINT "You lose sweets wort
h £";p(6)*z(6)
2381 PAUSE 150
2390 LET z(6)=0
2400 GO TO 2950
2405 REM ***********************
2410 PRINT "Animal rights protes
ters poison all your meat in you
r shop"''
2411 PAUSE 250
2420 LET losses=0
2430 FOR f=7 TO 10
2440 LET losses=losses+p(f)*z(f)
2450 LET z(f)=0
2460 NEXT f
2470 PRINT "As a result you lose
 £";losses
2471 PAUSE 150
2480 GO TO 2950
2485 REM ***********************
2490 PRINT "A power cut means th
at all your frozen and refridger
ated food   goes bad"''
2491 PAUSE 300
2500 LET losses=0
2510 FOR f=7 TO 10
2520 LET losses=losses+p(f)*z(f)
2530 LET z(f)=0
2540 NEXT f
2550 LET losses=losses+z(4)*p(4)
+z(5)*p(5)+z(12)*p(12)
2560 LET z(12)=0
2570 LET z(4)=0
2580 LET z(5)=0
2590 PRINT "The goods that you l
ost where   valued at £";losses'

2591 PAUSE 200
2600 GO TO 2950
2605 REM ***********************
2610 IF RND>.1 THEN  GO TO 2950
2620 LET lucky=INT (RND*6)
2630 IF lucky=5 THEN  GO TO 2710
2640 IF lucky=4 THEN  GO TO 2740
2650 IF lucky=3 THEN  GO TO 2770
2660 IF lucky=2 THEN  GO TO 2810
2670 IF lucky=1 THEN  GO TO 2880
2675 REM ***********************
2680 PRINT "Well done! You have
won an awardfor running the tidi
est shop in your area. You get a
 prize of   £100"''
2681 PAUSE 350
2690 LET cash=cash+100
2700 GO TO 2950
2705 REM ***********************
2710 PRINT "One day this week a
nearby rivalshop closed down so
you had a   £50 boost in sales"'

2711 PAUSE 300
2720 LET cash=cash+50
2730 GO TO 2950
2735 REM ***********************
2740 PRINT "Lucky you has won £7
5 on the    football pools"''
2741 PAUSE 150
2750 LET cash=cash+75
2760 GO TO 2950
2770 LET cheque=(INT (RND*10))*1
0
2780 PRINT "You find a cheque fo
r £";cheque''
2781 PAUSE 150
2790 LET cash=cash+cheque
2800 GO TO 2950
2805 REM ***********************
2810 PRINT "A customer complains
 that one ofyour products that s
he bought isfaulty. Do you give
her a new   one or not (y/n)"''
2820 INPUT "(y/n)   ";n$
2830 IF n$="n" THEN  GO TO 2870
2840 IF n$<>"y" THEN  GO TO 2820
2850 PRINT "You win a prize for
being the   most polite shopkeep
er about.   You get £90"''
2851 PAUSE 500
2860 LET cash=cash+90
2870 GO TO 2950
2875 REM ***********************
2880 PRINT "A polite representat
ive comes   into your shop and o
ffers you a new product. Do you
buy any. Thecost is 20p"''
2881 PAUSE 500
2890 INPUT "How many do you want
 ";nx
2900 IF nx=0 THEN  GO TO 2950
2910 PRINT "You buy ";nx;" of th
em at 20p"''
2911 PAUSE 100
2920 LET cash=cash-.2*nx
2930 PRINT "The product sells li
ke anything and makes you a prof
it of ";nx*.5
2931 PAUSE 250
2940 LET cash=cash+nx*.5
2950 CLS
2955 REM ***********************
2960 PRINT "This is the end of t
he week ";w''
2961 PAUSE 100
2970 PRINT "At the end of this w
eek you have£";cash
2971 PAUSE 150
2980 CLS
2985 LET cash=(INT (cash*100))/1
00
2987 IF cash<0 THEN  GO TO 3040
2990 NEXT w
3000 PRINT "At the end of the ye
ar you have made a profit of £";
cash''
3001 PAUSE 200
3010 PRINT "Well done for stayin
g out of thered"''
3020 STOP
3040 CLS : PRINT "Because you ow
e money you are   forced to liqu
idate your         business after
 week ";w''
3050 LET till=INT (RND*till)
3060 LET counter=INT (RND*counte
r)
3070 LET shelves=INT (RND*shelve
s)
3080 LET g$="You sell your "
3085 PRINT g$;"till at £";till
3090 PRINT g$;"counter at £";cou
nter
3100 PRINT g$;"shelves at £";she
lves
3105 PRINT '
3107 LET cash=cash+shelves+till+
counter
3110 PRINT "You now have a loss
of  £";ABS cash
3120 IF s$="buy" THEN  LET cash=
cash+INT (RND*500): GO TO 3140
3125 GO TO 3170
3130 PRINT "After selling your s
hop you have£";cash''
3140 IF cash<0 THEN  PRINT "You
still have a loss and so I  sugg
est you take a long rest    befo
re trying to pay off your   debt
s"'': STOP
3150 PRINT "You now have some ca
sh but the  bank demands that yo
u give it tothem to pay off your
 loan"''
3160 STOP : GO TO 3160
3170 PRINT "You have lost everyt
hing and nowyou are out on the s
treets      without a penny in y
our pockets"''
3999 STOP
5000 PRINT  INVERSE 1; INK 1;AT
5,2;"ITEM";AT 5,11; INK 2;"STOCK
";AT 5,17; INK 0;"NO.";AT 5,21;
INK 3;"PRICE";AT 5,27; INK 1;"CO
ST£"
5010 FOR F=AAA TO BBB
5020 PRINT AT f+7-aaa,0;CHR$ (f+
64);" ";z$(f);" ";z(f)
5030 NEXT f
5040 INPUT "Select what you need
 and press  the key or "0" to qu
it ";v$
5055 IF v$="0"  THEN  RETURN
5060 LET v=(CODE v$)-64
5065 IF v<aaa OR v>bbb THEN  GO
TO 5040
5070 PRINT AT v+7-aaa,21;p(v)
5080 INPUT ("How many ";z$(v);"
do you wish"'"to order  ");amoun
t
5082 IF amount<0 THEN  GO TO 508
0
5085 IF 500-z(v)-amount<1 THEN
PRINT #1;"You have not enough ro
om on the shelves for that amoun
t": PAUSE 200: GO TO 5080
5090 PRINT AT v+7-aaa,17;amount;
AT v+7-aaa,13;amount+z(v)
5100 LET cost=p(v)*amount
5110 IF cost>cash THEN  GO TO 13
70
5120 PRINT AT v+7-aaa,26;cost
5130 LET cash=cash-cost
5135 LET z(v)=z(v)+amount
5140 PRINT #1;"You have £";cash;
" cash left"
5150 PAUSE 100
5160 GO TO 5040
6000 PRINT "You cannot procede t
o run your  shop because you hav
e not made  enough money this we
ek to pay   your own wages. Cons
equently youhave died of hunger
as you couldnot buy your own foo
d"
```

ROTATOR

THIS UTILITY by Dave Trebilcock of Sale in Cheshire for any Spectrum allows strings to be printed in any direction on the screen. Characters stored in the Spectrum ROM or the user-defined character area can be stated in this fashion.

The following variables must be set up before the routine can be used:

Line and col used to hold start position of printing.
rotate degree of character rotation (90, 180, 270).
d$ direction of printing: r=right and left; d=down; u=up
z$ string to be printed.

Lines 100-190 contain a demonstration. The utility can be added to any Basic program and starts at line 9000. It is set up using the variables shown above.

```
  10 REM ROUTINE INITIALISATION
  20 CLEAR (USR "a")-8: REM   If
your program has machine code
routines replace 'USR "a"'by the
start address of them(see also
line 50)
  30 REM Insert any machine code
 loads here
  50 LET top=USR "a": LET line=0
: LET col=0: LET rotate=0: LET d
$="l": LET z$=""
 100 REM   Your program starts
here and replaces lines 110-190
 110 LET line=3: LET col=3: LET
z$="Multi": GO SUB 9000
 120 LET line=3: LET col=9: LET
z$="Directional": LET rotate=90:
 LET d$="d": GO SUB 9000
 130 LET line=13: LET col=7: LET
 z$="Print": LET rotate=180: LET
 d$="l": GO SUB 9000
 140 LET line=13: LET col=1: LET
 z$="& Rotation": LET rotate=270
: LET d$="u": GO SUB 9000
 150 LET line=7: LET col=5: LET
z$="↑": LET rotate=0: LET d$="r"
: GO SUB 9000
 160 LET line=8: LET col=6: LET
z$="↑": LET rotate=90: GO SUB 90
00
 170 LET line=9: LET col=5: LET
z$="↑": LET rotate=180: GO SUB 9
000
 180 LET line=8: LET col=4: LET
z$="↑": LET rotate=270: GO SUB 9
000
 190 STOP
8999 REM This is the last line
your program can use
9000 REM PRINT ROUTINE
9010 IF line<0 OR line>21 OR lin
e<>INT line THEN  LET line=0
9020 IF col<0 OR col>31 OR col<>
INT col THEN  LET col=0
9030 IF rotate<>90 AND rotate<>1
80 AND rotate<>270 THEN  LET rot
ate=0
9040 FOR a=1 TO 8
9050 POKE top-a,PEEK (USR "a"+(a
-1))
9060 NEXT a
9070 FOR z=1 TO LEN z$
9080 IF rotate<>0 AND z$(z)<>" "
 THEN  GO SUB 9210: LET z$(z)=CH
R$ 144
9090 PRINT AT line,col;z$(z)
9100 IF d$="u" OR d$="d" THEN  G
O TO 9140
9110 IF line=21*(d$="r") AND col
=31*(d$="r") THEN  LET line=21*(
d$="l"): LET col=31*(d$="l"): GO
 TO 9160
9120 IF col=31*(d$="r") THEN  LE
T line=line+1-2*(d$="l"): LET co
l=31*(d$="l"): GO TO 9160
9130 LET col=col+1-2*(d$="l"): G
O TO 9160
9140 IF line=21*(d$="d") THEN  L
ET line=21*(d$="u"): GO TO 9160
9150 LET line=line+1-2*(d$="u"):
 GO TO 9160
9160 NEXT z
9170 FOR a=1 TO 8: POKE (USR "a"
+(a-1)),PEEK (top-a): NEXT a
9180 RETURN
```

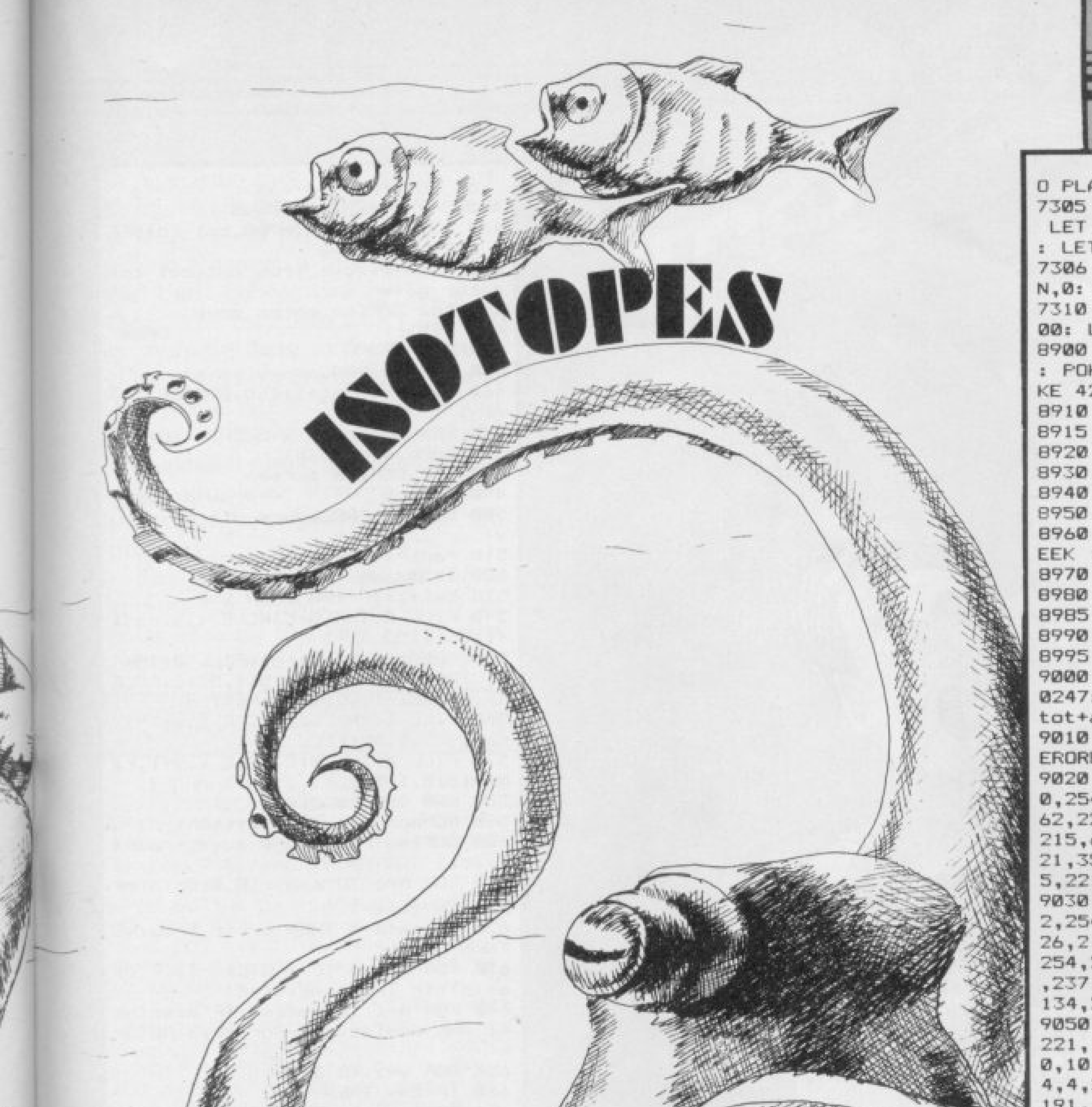
```
9200 REM ROTATE
9210 DIM a(8,8)
9220 PRINT #1; PAPER INT (PEEK 2
3624/8); INK INT (PEEK 23624/8);
AT 1,31;z$(z)
9230 FOR a=0 TO 7
9240 LET s=128: LET cnt=PEEK (22
527-256*a)
9250 FOR b=1 TO 8
9260 IF rotate=270 THEN  IF cnt>
s-1 THEN  LET a(b,8-a)=1: LET cn
t=cnt-s
9270 IF rotate=180 THEN  IF cnt>
s-1 THEN  LET a(8-a,9-b)=1: LET
cnt=cnt-s
9280 IF rotate=90 THEN  IF cnt>s
-1 THEN  LET a(9-b,a+1)=1: LET c
nt=cnt-s
9290 LET s=s/2
9300 NEXT b: NEXT a
9310 FOR a=0 TO 7: LET tot=0: LE
T s=128: FOR b=1 TO 8
9320 LET tot=tot+s*(a(a+1,b)<>0)
9330 LET s=s/2
9340 NEXT b: POKE USR "a"+(7-a),
tot: NEXT a
9350 RETURN
```



D ANGEROUS radioactive material lies buried in the weeds at the bottom of the ocean. The sub is ready and waiting. Bring the canisters up to the ship before the time runs out – but beware the blue octopi. Their tentacled touch is deadly. **Isotopes** runs on the 48K Spectrum.

The program uses our special abbreviations for graphics characters, so please read the instructions on the first page of Program Printout before entering the listing.

```
  20 POKE 23609,10: POKE 23658,8
: GO SUB 9000: GO SUB 8900: GO S
UB 2000: GO TO 25
  21 GO SUB 8900: GO SUB 2000
  25 PAPER 5: CLS : POKE 23624,8
: BORDER 1
  40 GO SUB 6000: GO SUB 6050
1000 LET x1=X: LET Y1=Y
1010 PRINT AT Y1,X1;"(2*sp)";AT
Y1+1,X;"(2*sp)"
1021 IF IN 32766=190 THEN  GO SU
B 3000
1022 LET X=X+(IN 57342=190)-(IN
57342=189): LET Y=Y+(IN 65022=19
0)-(IN 64510=190)
1023 IF PU=1 THEN  GO SUB 1510
1025 LET Y=Y+(Y<1)-(Y>16)
1026 LET X=X-(X>30)+(X<0)
1027 LET l=USR 60000
1028 IF ATTR (Y,X)<>40 OR ATTR (
Y+1,X)<>40 OR ATTR (Y,X+1)<>40 O
R ATTR (Y+1,X+1)<>40 THEN  GO SU
B 7000
1030 PRINT AT Y,X;"QR";AT Y+1,X;
"ST"
1031 IF TI=1 THEN  GO TO 5000
1032 IF TI<100 THEN  PRINT AT 21
,16; PAPER 7;"(sp)": IF TI<10 TH
EN  PRINT AT 21,15; PAPER 7;"(sp
)"
1035 IF PU=1 THEN  GO SUB 1500
1040 LET TI=TI-1: PRINT AT 21,14
; PAPER 7;TI
1090 GO TO 1000
1500 PRINT AT Y+2,X;"KL";AT Y+3,
X;"MN"
1505 RETURN
1510 PRINT AT Y1+2,X1; PAPER 5;"
(sp)";AT Y1+3,X1;"(sp)"
1520 RETURN
2000 PAPER 0: CLS : INK 7: POKE
23624,15: CLS : BORDER 1
2010 PRINT AT 0,12; BRIGHT 1;"IS
OTOPE"
2020 PRINT AT 2,0; INK 6;"In thi
s game you (the minisub)  must r
escue canisters full of   Radioa
ctive isotopes.Pick up thecanist
ers from amongst the weed and ta
ke them to your ship above"
2030 PRINT AT 7,0; INK 4;"You mu
st complete this task in  a cert
ain time or the Isotopes  will b
ecome too dangerous."
2035 PRINT AT 10,0; INK 3;"Unfor
tunately the Isotopes are  place
d in Blue Octopus infested water
s and you must avoid them"
2040 PRINT AT 19,3;"Q=up;A=down;
O=left;P=right";AT 18,7;"SPACE=p
ick up/drop"
2041 PRINT AT 14,12;; INK 4;"I(5
*sp)"; INK 2;"KL(4*sp)"; INK 7;"
(3*sp)QR"
2042 PRINT AT 15,12; INK 4;"J(5*
sp)"; INK 2;"MN(4*sp)"; INK 7;"(
3*sp)ST"
2043 PRINT AT 16,0;"(sp)OCTOPUS(
3*sp)WEED(3*sp)CAN(5*sp)SUB"
2049 LET IN=0
2050 PRINT AT 21,0;"(5*sp)PRESS
KEY (S) TO PLAY"
2051 PRINT AT 14,3; INK 5;"EF";A
T 15,3;"GH"
2052 PRINT AT 0,12; INK IN;"ISOT
OPE": LET IN=IN+1: IF IN=8 THEN
 LET IN=0
2053 PAUSE 6
2054 IF INKEY$="S" THEN  GO TO 2
090
2056 PRINT AT 14,3; INK 5;"AB";A
T 15,3;"CD"
2057 PAUSE 6: GO TO 2051
2090 PAPER 5: CLS : BORDER 1: IN
K 0: RETURN
3000 IF Y=16 THEN  GO TO 3010
3001 IF Y=1 THEN  GO TO 3100
3002 IF Y<>16 OR Y<>1 THEN  RETU
RN
3010 IF ATTR (Y+2,X)<>42 OR ATTR
 (Y+2,X+1)<>42 THEN  GO TO 3190
3020 LET PU=1: POKE 60230,INT (R
ND*6)+16: FOR n=10 TO 150 STEP 1
0: POKE 60228,n: LET l=USR 60227
: NEXT n: PRINT AT Y+2,X;"(2*sp)
";AT Y+3,X;"(2*sp)": BORDER 1
3030 RETURN
3100 IF X<10 OR X>20 OR PU=0 THE
N  RETURN
3110 PRINT AT Y1+2,X1;"(2*sp)";A
T Y1+3,X1;"(2*sp)"
3115 POKE 60230,INT (RND*6)+16:
FOR n=150 TO 10 STEP -10: POKE 6
0228,n: LET l=USR 60227: NEXT n:
 BORDER 1
3120 LET PU=0: LET SC=SC+100: PR
INT AT 21,26; PAPER 7;SC: PAPER
5: LET CAN=CAN+1: LET PUF=FT-CAN
: IF CAN=FT+1 THEN  GO TO 4000
3190 RETURN
4000 REM DONE
4010 CLS : PRINT AT 8,11;"WELL D
ONE!";AT 10,3;"YOU HAVE RECOVERE
D ALL THE          RADIO-ACTIVE IS
OTOPES."
4020 PRINT AT 14,7; INK 1;"YOUR
TIME WAS ";TI
4025 PRINT AT 16,11; INK 2; FLAS
H 1;"BONUS ";TI: LET SC=SC+TI
4030 FOR n=9 TO 90: POKE 60181,n
: LET I=USR 60179: NEXT n
4040 PRINT #0;" PRESS A KEY TO M
OVE ON TO NEXT           RECOVERY
 SITE"
4045 BORDER 1: PAUSE 0
4050 LET CAN=0: LET FT=FT+1: LET
 PUF=FT: LET PC=PC-3: IF FT=9 TH
EN  LET FT=9
4055 IF PC<1 THEN  LET PC=1
4060 CLS : LET Y=1: LET TI=200+5
0*FT: LET Z=Z+1: GO SUB 8900: LE
T X=15: GO TO 30
5000 CLS : PRINT AT 10,7; FLASH
1; INK 2;"YOU ARE OUT OF TIME"
5010 PRINT AT 12,4;"THE RADIO-AC
TIVE ISOTOPES        HAVE REACHED
 A DANGEROUSLY              HIGH
LEVEL"''"          MISSION ABANDONE
D"
5015 FOR n=130 TO 9 STEP -1: POK
```




```
E 60181,n: LET l=USR 60179: NEXT
 n
5020 PAUSE 600: GO TO 7200
6000 FOR M=0 TO PUF: FOR N=PC TO
 PC+PUF*3 STEP 3: PRINT AT 18,N;
 INK 2;"KL": NEXT N: NEXT M
6001 FOR M=0 TO PUF: FOR N=PC TO
 PC+PUF*3 STEP 3: PRINT AT 19,N;
 INK 2;"MN": NEXT N: NEXT M
6002 INK 4: FOR N=0 TO 32 STEP 3
: PRINT AT 16,N;"I": NEXT N: FOR
 N=0 TO 32 STEP 3: PRINT AT 17,N
;"J": NEXT N
6003 FOR N=0 TO 32 STEP 3: PRINT
 AT 18,N;"J": NEXT N: FOR N=0 TO
 32 STEP 3: PRINT AT 19,N;"J": N
EXT N
6004 INK 0: RETURN
6050 PRINT AT 20,0; PAPER 6;L$
6055 PRINT AT 21,0; PAPER 7;L$:
PRINT AT 21,0; PAPER 7;"SUBS=";L
I;"   TIME=";TI;"   SCORE=";SC
6060 PRINT AT 0,10;"O(10*sp)P"
6100 RETURN
7000 POKE 60139,40: LET LI=LI-1:
 PRINT AT 21,5; PAPER 7;LI
7005 LET CAR=CAN
7010 LET l=USR 60201
7020 IF LI=0 THEN  GO TO 7200
7030 LET PU=0: LET Y=1: LET X=16
: CLS : GO TO 30
7200 PAPER 0: POKE 23624,0: PAUS
E 300:
7210 PRINT AT 20,0; PAPER 0; INK
 6;"           GAME OVER
  "
7220 POKE 60230,17: FOR N=0 TO 1
9: POKE 60228,170: PRINT AT 21,0
; PAPER 0;L$: LET L=USR 3280: RA
NDOMIZE USR 60227: NEXT N: BORDE
R 1
7230 POKE 60181,255: PRINT AT 7,
5; INK 5;"WELL DONE A GOOD TRY":
 FOR N=0 TO 4: LET L=USR 60179:
NEXT N
7235 BORDER 1
7240 PAUSE 30: PRINT AT 10,8; IN
K 4;"YOU SCORED ";SC: LET L=USR
60201
7300 PRINT#0;"  PRESS ANY KEY T
O PLAY AGAIN"
7305  INK 0: LET Z=2: LET CAN=0:
 LET PC=10: LET FT=2: LET PUF=FT
: LET y=3: LET X=16:
7306 FOR N=42000 TO 42050: POKE
N,0: NEXT N
7310 PAUSE 0: LET LI=9: LET TI=2
00: LET SC=0: GO TO 21
8900 POKE 42000,4: POKE 42001,14
: POKE 42002,1: POKE 42003,0: PO
KE 42004,1: POKE 42005,255
8910 CLS : LET a=42005
8915 FOR f=1 TO z
8920 POKE a,INT (RND*29+2)
8930 POKE a+1,INT (RND*10+4)
8940 POKE a+2,1
8950 POKE a+3,1
8960 IF NOT PEEK (a+2) AND NOT P
EEK (a+3) THEN  GO TO 8940
8970 POKE a+4,1
8980 POKE a+5,255
8985 LET a=a+5
8990 NEXT f
8995 RETURN
9000 LET tot=0: FOR n=60000 TO 6
0247: READ a: POKE n,a: LET tot=
tot+a: NEXT n
9010 IF tot<>28578 THEN  PRINT "
ERORR IN DATA DO NOT RUN": STOP
9020 DATA 221,33,16,164,221,126,
0,254,255,40,34,95,221,86,1,6,2,
62,22,215,122,215,123,215,62,32,
215,62,32,215,20,16,240,221,35,2
21,35,221,35,221,35,221,35,24,21
5,221,33,16,164,221,126
9030 DATA 0,254,255,200,221,134,
2,254,255,40,4,254,31,32,8,221,1
26,2,237,68,221,119,2,221,126,1,
254,2,40,4,254,14,32,8,221,126,3
,237,68,221,119,3,221,126,0,221,
134,2,221,119
9050 DATA 0,221,126,1,221,134,3,
221,119,1,14,144,221,203,4,126,4
0,10,221,203,4,190,62,4,129,79,2
4,4,221,203,4,254,221,126,4,203,
191,198,40,50,143,92,221,86,1,6,
2,62,22,215
9060 DATA 122,215,221,126,0,215,
121,215,12,121,215,12,20,16,238,
221,35,221,35,221,35,221,35,221,
35,195,145,234
9070 DATA 243,14,255,62,16,237,1
63,65,16,254,62,7,237,163,65,16,
254,13,32,239,251,201,6,35,197,3
3,0,3,17,1,0,229,205,181,3,225,1
7,16,0,167,237,82,32,240,193,16,
233,201,14,0,62,16,211,254
9080 DATA 65,16,254,62,7,211,254
,65,16,254,13,32,239,201
9100 RESTORE 9100: FOR n=USR "a"
 TO USR "t"+7: READ a: POKE n,a:
 NEXT n
9110 DATA 0,0,0,0,1,3,5,71,0,0,0
,0,128,192,164,234,166,30,11,180
,201,18,17,34,105,112,246,217,36
,34,17,12
9120 DATA 0,0,0,0,33,67,69,37,0,
0,0,0,128,195,164,168,39,159,139
,116,9,17,98,12,233,242,244,216,
37,34,32,16
9130 DATA 0,82,44,56,60,120,120,
60,60,120,120,60,60,120,120,60,2
3,63,126,255,254,254,254,185,152
,252,126,255,127,127,127,157,185
,255,254,255,255,120,63,25,157,2
55,127,255,255,30,252,152
9140 DATA 255,127,63,31,15,7,3,1
,252,248,244,252,244,240,254,0,0
,7,15,28,60,231,127,255,0,128,24
8,132,178,177,161,255,104,238,10
9,235,104,63,31,12,213,255,214,2
52,248,240,224,96
9500 LET Z=2: LET X=16: LET Y=1:
 LET LI=5: LET SC=0: LET TI=200:
9510 LET L$="(32*sp)": LET PU=0
9920 LET CAN=0: LET PC=1: LET FT
=2: LET PUF=FT
9950 RETURN
9999 SAVE "ISOTOPE": POKE 23736,
181: GO TO 9999
```



INTRODUCING an ancient puzzle with a new twist for your QL. The idea in **Slipped Discs** by R. Hartill from Pontypridd, Wales, is to take the discs from the first peg, which is on the left of the screen, and reassemble them in the same order on the third peg, on the right.

Unlike the original puzzle, the Towers of Hanoi, you can select the number of discs you require. Once you have made your choice the QL will calculate the optimum number of moves in which the puzzle can be solved.

```
10 REMark Tower of Brahma by Rob
ert Hartill
20 REMark 26 Dynea Road,Rhydyfel
in,Pontypridd
30 MODE 8:WINDOW 430,150,38,55
40 OPEN#3,SCR:WINDOW#3,270,24,13
5,20
50 OPEN#4,SCR:WINDOW#4,270,24,14
0,25
60 INK#3,6:PAPER#3,3:CSIZE£3,3,1
70 PAPER#4,2:PAPER#2,0:PAPER 0:S
CALE 84,0,0
80 PRINT#0,"Enter amount of disc
s required.":INPUT#0,amo
90 IF amo<4 THEN PRINT#0,"4 or m
ore discs please.":GO TO 80
100 lowest:PRINT#0,"Least moves=
";low;".Press any key.":PAUSE
110 DIM disc(amo):count=-1:FOR n
=1 TO amo:disc(n)=1
120 DIM a(amo),b(amo)
130 FOR n=1 TO amo
140 bval=15+(amo-n)*(30/amo)
150 a(n)=30:b(n)=bval
160 NEXT n
170 CLS#0:screen:enter_move
180 DEFine PROCedure enter_move
190 CSIZE 3,1:INK 7:AT 1,1:PRINT
 TO 4;1;TO 14;2;TO 23;3
200 CLS#4:CLS#3:INK#3,6:BORDER#3
,1,7:CSIZE#3,0,1:PRINT#3;"Moves
taken so far ";count
210 no=1
220 FOR n=1 TO amo:IF disc(n)<>3
 THEN no=0
230 IF no THEN FINISH
240 CLS#0:CSIZE#0,0,1:AT#0,1,1:P
RINT#0;"Moving from column ";:FL
ASH#0,1:PRINT#0;"?";:FLASH#0,0
250    REPeat loop
260    row=CODE(INKEY$)
270    IF row=232 THEN RUN
280    IF row=49 THEN col=1:EXIT
loop
290    IF row=50 THEN col=2:EXIT
loop
300    IF row=51 THEN col=3:EXIT
loop
310    END REPeat loop
320 BEEP 1000,5
330 AT#0,1,22:PRINT#0;"to column
 ";:FLASH#0,1:PRINT#0,"?";:FLASH
#0,0
340 AT#0,1,20:PRINT#0,col
350    REPeat press
360    row2=CODE(INKEY$)
370    IF row2=49 AND col<>1 THEN
 col_to=1:EXIT press
380    IF row2=50 AND col<>2 THEN
 col_to=2:EXIT press
390    IF row2=51 AND col<>3 THEN
 col_to=3:EXIT press
400    END REPeat press
410 AT#0,1,32:PRINT#0,col_to:BEE
P 1000,5:safe=0
420 safe=0:move_from col,col_to:
enter_move
430 END DEFine enter_move
440 REMark                  DRAW
SCREEN
450 DEFine PROCedure screen
460 count=count+1:CLS:BORDER 1,7
:k=1
470 FOR p=amo TO 1 STEP -1:discs
 1+amo-p,a(p),b(p)
480 END DEFine screen
490 REMark            draw discs
500 DEFine PROCedure discs (s,x,
y)
510 radi=1+35-s*(29/amo)
520 l=30/amo
530 k=k+1:IF k=8 THEN k=2
540 FILL 0:INK 0:CIRCLE x,y,radi
+1,.5,1.52
550 FOR n=y TO y+l-1:FILL 0:INK
k:CIRCLE x,n,radi,.5,1.52:CIRCLE
 x,n,radi-1,.5,1.52:NEXT n
560 FILL 1:INK k:CIRCLE x,y+l-1,
radi,.5,1.52:FILL 0
570 FILL 0:INK 0:CIRCLE x,y+l,ra
di+1,.5,1.52
580 END DEFine discs
590 REMark     The movement
600 DEFine PROCedure move_from (
fr,t)
610 FOR n=1 TO amo :IF disc(n)=f
r THEN safe=1
620 IF safe=0 THEN error_trap:RE
Turn
630 FOR n=amo TO 1 STEP -1:IF di
sc(n)=fr THEN smdisc=n
640 FOR n=1 TO smdisc:IF disc(n)
=t AND smdisc>n:error_trap:RETur
n
650 FOR v=1 TO 3
660 IF t=v THEN
670 FOR w= amo TO 1 STEP -1
680 IF smdisc=w THEN b(w)=15:a(w
)=30+((v-1)*60)
690 NEXT w
700 END IF
710 END FOR v
720 FOR n=1 TO amo
730 FOR c=1 TO amo
740 IF disc(n)=t AND smdisc=c TH
EN b(c)=b(c)+30/amo
750 NEXT c
760 NEXT n
770 disc(smdisc)=t:screen
780 END DEFine move_from
790 REMark   The end
800 DEFine PROCedure FINISH
810 BEEP 30000,512,512,512,512,5
12,512:CLS#2
820 FLASH#0,1:CSIZE#0,0,1:CLS#0:
PRINT#0;TO 4;"YOU FINISHED IN ";
count;" MOVES":FLASH#0,0
830 IF count=low THEN FLASH 1:PR
INT"You finished in the least po
ssible moves ,";low:FLASH  0
840 PRINT"PRESS 'Y' FOR ANOTHER
GO     OR 'N' TO QUIT"
850    REPeat press
860    KEY$=INKEY$
870    IF KEY$="y" OR KEY$="Y" TH
EN RUN
880    IF KEY$="N" OR KEY$="n" TH
EN STOP
890    END REPeat press
900 END DEFine FINISH
910 REMark          Error trap
920 DEFine PROCedure error_trap
930 CLS#0:PRINT#0,"Col ";col;" t
o col ";col_to;" is illegal"
940 FLASH#3,1:PRINT#3,"    Press
any key.":FLASH#3,0:PAUSE
950 END DEFine error_trap
960 DEFine PROCedure lowest:low=
0
970 FOR h=1 TO amo:low=low*2+1
980 END DEFine
```

SHARPEN up your wits for **Target** by David Myles of Methil Leven, Fife. The program runs on a 48K Spectrum or Spectrum Plus, and is that rare thing, an educational game which is actually fun to play.

You are given a row of numbers and must choose two by firing at them. You may then add, substract or multiply them to try and get as close as possible to a target number. The game is for two players and besides improving your mental arithmetic it also contains plenty of scope for clever strategy. Full instructions are provided in the program.

The game uses our special abbreviations for graphics characters so please read the first page of Program Printout before entering the listing.



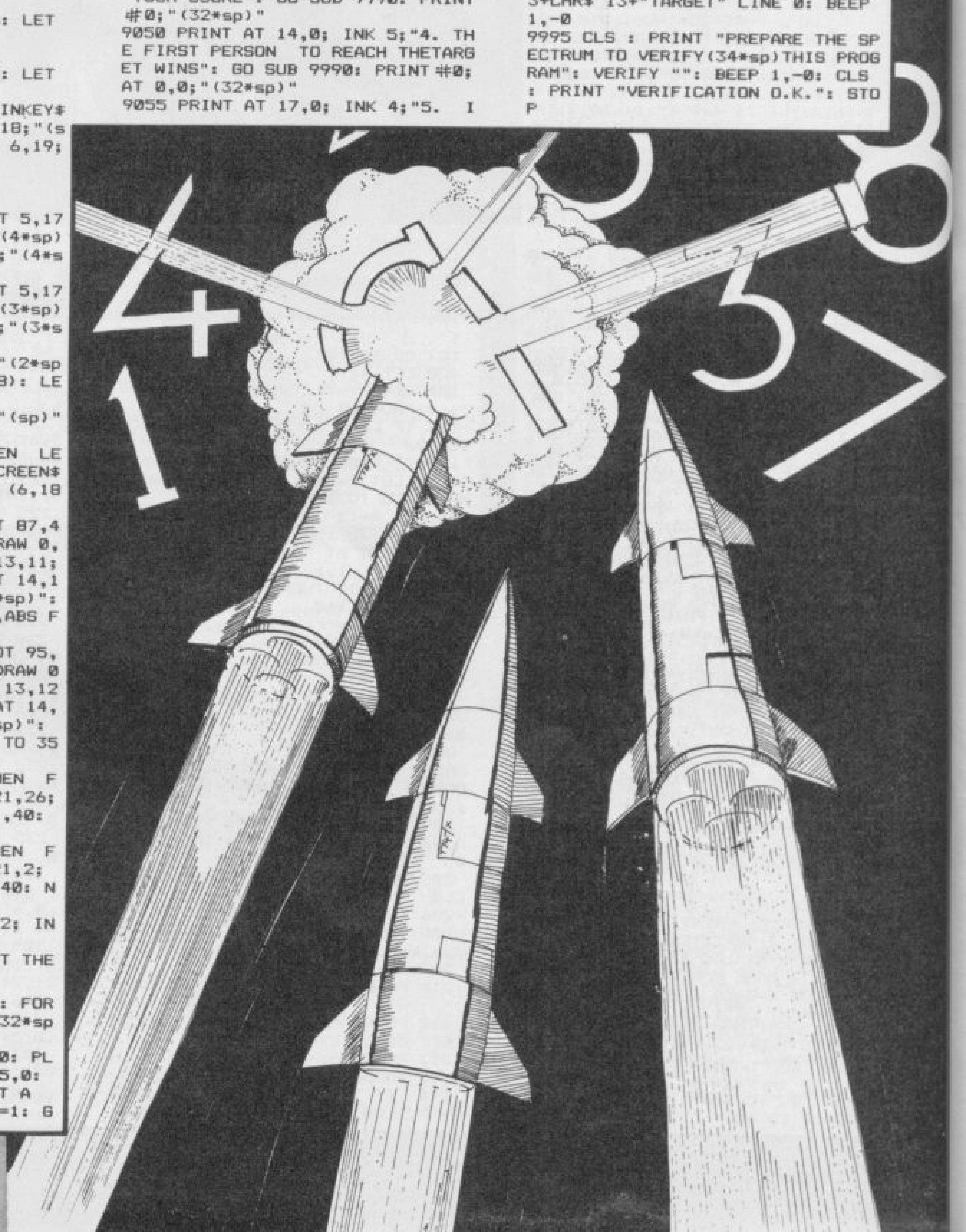

```
   1 CLS : POKE 23658,8: DIM N$(
2,7): BORDER 0: PAPER 0: INK 7:
BRIGHT 0: INVERSE 0: OVER 0: FLA
SH 0: CLS : PRINT AT 9,4; FLASH
1; PAPER 4; INK 1; BRIGHT 1;"S T
 O P  T H E  T A P E";AT 11,7; P
APER 6; INK 2; FLASH 0;"TARGET H
AS LOADED"
   2 FOR A=0 TO 7: READ B: POKE
USR "A"+A,B: NEXT A: DATA 24,24,
60,60,126,126,255,255
   3 FOR A=0 TO 500: NEXT A: FOR
 A=0 TO 30: PRINT AT 9,A; INK 2;
"(sp)A": BEEP .01,A: BEEP .005,0
: NEXT A: PRINT AT 9,31;"(sp)":
FOR A=30 TO 0 STEP -1: PRINT AT
11,A; INK 2;"A(sp)": BEEP .01,A:
 BEEP .01,-10: NEXT A: PRINT AT
11,0;"(sp)"
  10 PLOT 15,111: DRAW 0,25: DRA
W 25,0: DRAW 0,-25: DRAW -25,0
  11 PLOT 55,111: DRAW 0,25: DRA
W 25,0: DRAW 0,-25: DRAW -25,0
  12 PLOT 95,111: DRAW 0,25: DRA
W 25,0: DRAW 0,-25: DRAW -25,0
  13 PLOT 135,111: DRAW 0,25: DR
AW 25,0: DRAW 0,-25: DRAW -25,0
  14 PLOT 175,111: DRAW 0,25: DR
AW 25,0: DRAW 0,-25: DRAW -25,0
  15 PLOT 215,111: DRAW 0,25: DR
AW 25,0: DRAW 0,-25: DRAW -25,0
  20 LET B=0: LET A$="TARGET": F
OR A=3 TO 31 STEP 5
  21 LET b=b+1: PRINT AT 18,a; I
NK 2;"A": PLOT a*8+4,32: DRAW 0,
78
  22 PRINT AT 5,A-1; PAPER 2; IN
K 7;"(3*sp)";AT 6,A-1;"(3*sp)";A
T 7,A-1;"(3*sp)"
  23 PRINT AT 6,A; INK 7; PAPER
2;A$(B)
  24 BEEP .01,0
  25 PRINT AT 18,a;"(sp)": PLOT
 OVER 1;a*8+4,32: DRAW  OVER 1;0
,78
  26 IF A<26 THEN  FOR C=A TO A+
4: PRINT AT 18,C; INK 2;"A": BEE
P .01,A: PRINT AT 18,C;"(sp)": N
EXT C
  29 NEXT A
  30 OVER 0: PRINT AT 10,0; PAPE
R 6; INK 2;"WRITTEN BY DAVID MYL
ES JUNE 1985";AT 17,5; PAPER 0;
INK 7;"A GAME FOR TWO PLAYERS"
  31 FOR a=0 TO 400: NEXT a
  35 PRINT AT 17,0;"WOULD YOU LI
KE INSTRUCTIONS(Y/N)"
  40 IF INKEY$="Y" OR INKEY$="y"
 THEN  GO TO 9000
  41 IF INKEY$="N" OR INKEY$="n"
 THEN  GO TO 100
  43 GO TO 40
 100 CLS
 105 PRINT AT 0,5; INK 3;"PLEASE
ENTER YOUR NAME";AT 1,8;"(MAX 7
LETTERS)"
 106 PRINT AT 4,2; INK 5;"PLAYER
1"
 107 GO TO 200
 150 LET A=12
 151 LET A$=""
 160 PAUSE 0
 163 IF CODE INKEY$=13 THEN  GO
TO 170
 164 IF CODE INKEY$=12 AND A>12
THEN  LET A=A-1: PRINT AT P,A;"(
sp)": GO TO 160
 165 IF A=12 AND CODE INKEY$=12
THEN  GO TO 160
 166 PRINT AT P,A;INKEY$
 167 BEEP .1,1: LET A=A+1
 168 IF A=19 THEN  GO TO 170
 169 GO TO 160
 170 LET A$="": FOR A=12 TO 20:
LET B$=SCREEN$ (P,A)
 173 LET A$=A$+B$: NEXT A:
 174 LET N$(N)=A$
 175 BEEP .3,0: RETURN
 201 LET N=1: LET P=4: GO SUB 15
0: GO TO 204
 203 BORDER 0: FOR A=1 TO 500: B
ORDER 2: BORDER 6: BORDER 4: BOR
DER 5: BORDER 0: PAUSE 1: NEXT A
: GO TO 430
 204 LET N=2: LET P=4: PRINT AT
4,9; INK 5;"2(15*sp)": GO SUB 15
0
 205 LET A$="(3*sp)": PAUSE 10:
CLS
 206 FOR A=15 TO 254 STEP 40
 208 PLOT A,111: DRAW 0,25: DRAW
25,0: DRAW 0,-25: DRAW -25,0
 209 NEXT A
 210 PRINT AT 2,0; INK 2;"(32*g3
)"
 212 PRINT AT 17,0; INK 1; PAPER
2;"(32*g3,32*ig3)"
 213 PRINT AT 17,12; PAPER 2; IN
K 7;"TARGET";AT 18,12;"(6*sp)"
 214 LET T=(RND*150)+50: IF T>15
0 OR T<50 THEN  GO TO 214
 215 LET DE=T/60: FOR A=0 TO T:
PRINT AT 18,14; PAPER 2; INK 7;A
: BEEP .01,A/DE: NEXT A
 218 PRINT AT 18,14; PAPER 2; IN
K 7;INT T
 219 LET P=1: LET B=1: LET P1=0:
 LET P2=0
 222 PRINT AT 0,5; FLASH 1; INK
1; PAPER 6;"ITS YOUR SHOT ";N$(P
)
 223 PRINT AT 20,10;"PRESS SPACE
";AT 21,10;"  TO FIRE": FOR A=3
TO 31 STEP 5
 224 PRINT AT 6,A; PAPER 0; INK
6;;INT (RND*9)+1: NEXT A
 225 FOR A=0 TO 29: PAUSE 2
 226 PRINT AT 16,A; INK 2;"(sp)A
"
 227 IF INKEY$<>"(sp)" THEN  NEX
T A: PRINT AT 16,30;"(2*sp)": GO
 TO 225
 228 PLOT A*8+11,48: DRAW 0,61:
 229 IF ATTR (6,A+1)<>6 THEN  BE
EP .001,60: GO TO 235
 230 PRINT AT 5,A; PAPER 2; INK
7;"(3*sp)";AT 6,A; OVER 1;"(3*sp
)";AT 7,A; OVER 0;"(3*sp)"
 231 BEEP .2,0: LET A$(B)=SCREEN
$ (6,A+1): LET B=B+1
 232 IF B=3 AND P=1 THEN  LET B=
0: LET P=2: GO TO 300
 233 IF B=3 AND P=2 THEN  LET B=
0: LET P=1: GO TO 300
 235 PLOT  OVER 1;A*8+11,48: DRA
W  OVER 1;0,61: GO TO 226
 300 FOR G=0 TO 10: NEXT G: PLOT
  OVER 1;A*8+11,48: DRAW  OVER 1
;0,61: PRINT AT 20,10;"(11*sp)";
AT 21,10;"(11*sp)"
 305 PRINT AT 19,24; PAPER 2; IN
K 7;N$(2);AT 20,24;" SCORE ";AT
21,24;"(7*sp)";AT 21,26;P2
 306 PRINT AT 19,0; PAPER 2; INK
 7;N$(1);AT 20,0;" SCORE ";AT 21
,0;"(7*sp)";AT 21,2;P1
 307 LET C=VAL A$(1): LET D=VAL
A$(2)
 310 PRINT AT 0,0;"A=ADD,S=SUBTR
```

continued on page 86

continued from page 85

```
ACT & M=MULTIPLY"
 311 IF INKEY$="A" THEN  LET A=C
+D: PRINT AT 0,31;"A": LET B$="+
": GO TO 320
 312 IF INKEY$="S" THEN  LET A=C
-D: PRINT AT 0,31;"S": LET B$="-
": GO TO 320
 313 IF INKEY$="M" THEN  LET A=C
*D: PRINT AT 0,31;"M": LET B$="X
": GO TO 320
 314 GO TO 311
 320 PRINT AT 0,0;"(32*sp)": FOR
B=4 TO 16: PRINT AT B,0;"(32*sp
)": NEXT B
 321 PRINT AT 0,0;"TYPE IN YOUR
ANSWER"
 322 PLOT 70,111: DRAW 0,25: DRA
W 47,0: DRAW 0,-25: DRAW -47,0
 323 PRINT AT 6,10;C;B$;D;AT 6,1
5;"="
 324 IF A<10 THEN  LET L=8: GO T
O 326
 325 LET L=17
 326 PLOT 135,111: DRAW 0,25: DR
AW 16+L,0: DRAW 0,-25: LET L=L+1
6: DRAW -L,0
 327 IF C<D AND B$="-" THEN  PRI
NT AT 6,17;"-"
 328 IF A>9 THEN  LET V=18: LET
X=19: GO TO 330
 329 LET V=17: LET X=18
 330 FOR G=V TO X: PAUSE 0: LET
D$=INKEY$
 331 IF INKEY$<CHR$ 48 OR INKEY$
>CHR$ 57 THEN  PRINT AT 6,18;"(s
p)": IF A>9 THEN  PRINT AT 6,19;
"(sp)": GO TO 330
 332 PRINT AT 6,G;D$
 333 NEXT G
 334 IF V=18 THEN  PRINT AT 5,17
; OVER 1; PAPER 2; INK 7;"(4*sp)
";AT 6,17;"(4*sp)";AT 7,17;"(4*s
p)"
 335 IF V=17 THEN  PRINT AT 5,17
; OVER 1; PAPER 2; INK 7;"(3*sp)
";AT 6,17;"(3*sp)";AT 7,17;"(3*s
p)"
 336 IF V=18 THEN  LET A$="(2*sp
)": LET A$(1)=SCREEN$ (6,18): LE
T A$(2)=SCREEN$ (6,19)
 337 IF V=17 THEN  LET A$="(sp)"
: LET A$(1)=SCREEN$ (6,18)
 338 IF V=17 AND B$="-" THEN  LE
T A$="(2*sp)": LET A$(1)=SCREEN$
 (6,17): LET A$(2)=SCREEN$ (6,18
)
 340 IF VAL A$=A THEN  PLOT 87,4
7: DRAW 0,25: DRAW 73,0: DRAW 0,
-25: DRAW -73,0: PRINT AT 13,11;
 PAPER 2; INK 7;"(9*sp)";AT 14,1
1;" CORRECT ";AT 15,11;"(9*sp)":
 FOR F=-30 TO 30: BEEP .01,ABS F
: NEXT F
 350 IF VAL A$<>A THEN  PLOT 95,
47: DRAW 0,25: DRAW 57,0: DRAW 0
,-25: DRAW -57,0: PRINT AT 13,12
; PAPER 2; INK 7;"(7*sp)";AT 14,
12;" WRONG ";AT 15,12;"(7*sp)":
BEEP 1,-25: BEEP 1,-30: GO TO 35
5
 351 IF VAL A$=A AND P=1 THEN  F
OR Z=P2 TO P2+A: PRINT AT 21,26;
 PAPER 2; INK 7;Z: BEEP .01,40:
NEXT Z: LET P2=P2+A
 352 IF VAL A$=A AND P=2 THEN  F
OR Z=P1 TO P1+A: PRINT AT 21,2;
PAPER 2; INK 7;Z: BEEP .01,40: N
EXT Z: LET P1=P1+A
 353 PRINT AT 21,26; PAPER 2; IN
K 7;P2;AT 21,2;P1
 354 IF P1=INT T OR P2=INT T THE
N  GO TO 400
 355 PRINT AT 0,0;"(32*sp)": FOR
B=4 TO 16: PRINT AT B,0;"(32*sp
)": NEXT B
 356 FOR A=15 TO 254 STEP 40: PL
OT A,111: DRAW 0,25: DRAW 25,0:
DRAW 0,-25: DRAW -25,0: NEXT A
 357 LET A$="(2*sp)": LET B=1: G
O TO 222
 400 CLS : IF P1=INT T THEN  LET
K=1: GO TO 402
 401 LET K=2
 410 PRINT AT 10,0; INK 6;"THE W
INNERS IS.................."
 412 FOR A=21 TO 12 STEP -1: PRI
NT AT A,13;N$(K): BEEP .01,A: BE
EP .01,A+10: BEEP .01,A+20: NEXT
A
 420 GO TO 203
 500 CLS : GO TO 10
9000 PAUSE 10: CLS
9010 PRINT AT 0,10;"INSTRUCTIONS
";AT 1,10;"(12*sp)"
9020 PRINT AT 3,0; INK 4;"1. YOU
 MUST FIRST CHOOSE TWO     NUMBER
S BY SHOOTING AT THEM": GO SUB 9
990: PRINT #0;"(32*sp)"

9030 PRINT AT 6,0; INK 5;"2. YOU
 THEN HAVE TO CHOOSE IF    YOU WO
ULD LIKE TO ADD,SUBTRACT   OR MU
LTIPLY THE TWO NUMBERS": GO SUB
9990: PRINT #0;AT 0,10;"(12*sp)"
9040 PRINT AT 10,0; INK 6;"3. YO
U MUST  THEN ANSWER THE SUM CORR
ECTLY  AND IT WILL BE ADDED    TO
 YOUR SCORE": GO SUB 9990: PRINT
#0;"(32*sp)"
9050 PRINT AT 14,0; INK 5;"4. TH
E FIRST PERSON  TO REACH THETARG
ET WINS": GO SUB 9990: PRINT #0;
AT 0,0;"(32*sp)"
9055 PRINT AT 17,0; INK 4;"5.  I
F YOU GO OVER THE TARGET     YOU
MUST TRY TO GET A NEGATIVE   NUMB
ER eg. 1-9 = -8"
9060 FOR B=0 TO 9: FOR A=0 TO 6:
 PAUSE 5: PRINT AT 21,8;"USE ";
INK A;"SPACE"; INK 7;" TO FIRE":
 BEEP .001,A*7: NEXT A: NEXT B:
GO TO 9070
9070 CLS : PRINT AT 8,7;"WOULD Y
OU LIKE TO";AT 10,3;"SEE THE INS
TRUCTIONS AGAIN";AT 12,13;"(Y/N)
"
9071 IF INKEY$="Y" THEN  GO TO 9
000
9072 IF INKEY$="N" THEN  GO TO 1
00
9073 GO TO 9071
9900 STOP
9990 PRINT )0;AT 0,10;"PRESS SPA
CE"
9991 IF INKEY$="(sp)" THEN  FOR
A=1 TO 10: BEEP .009,A: NEXT A:
RETURN
9992 GO TO 9991
9993 CLEAR : PRINT "PREPARE THE
SPECTRUM TO SAVE(36*sp)THIS PROG
RAM"
9994 SAVE CHR$ 13+CHR$ 13+CHR$ 1
3+CHR$ 13+"TARGET" LINE 0: BEEP
1,-0
9995 CLS : PRINT "PREPARE THE SP
ECTRUM TO VERIFY(34*sp)THIS PROG
RAM": VERIFY "": BEEP 1,-0: CLS
: PRINT "VERIFICATION O.K.": STO
P
```



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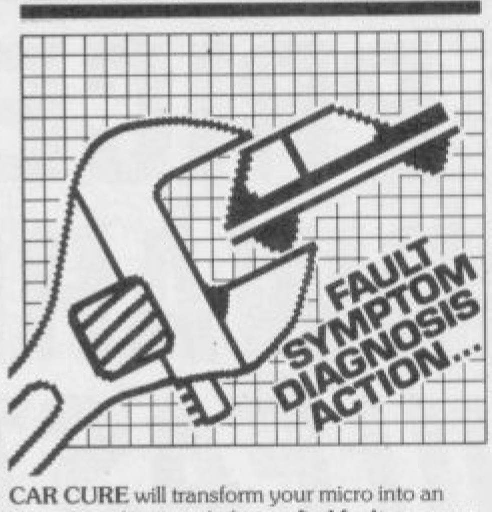
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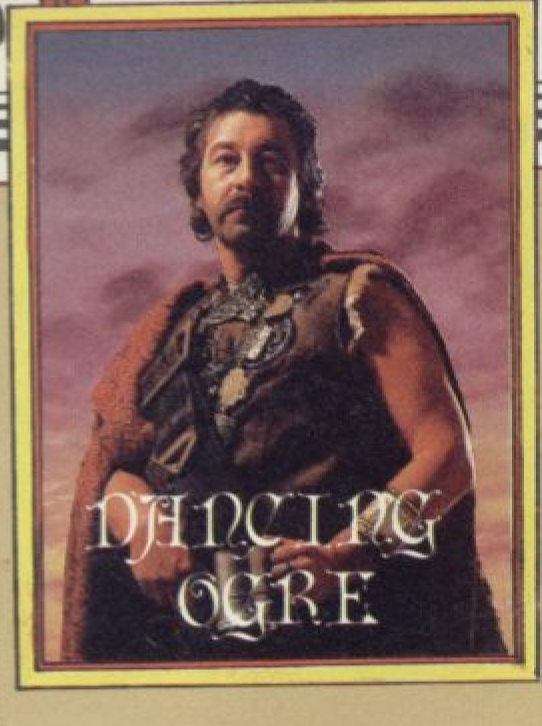
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Gordo dispenses wisdom to adventurers in the Urunnar Marshes

WE LEFT Samarrak in the dawn, heading south and east to reach the Imperial Highway and the frontier of Maru. I confess I was in an ill mood, after being fleeced by the smug landlord of the Damaged Dragon.

Eighteen silver pieces he charged, that crafty southerner! It would have cost me more but I refused resolutely to pay the seven extra coins he demanded because, he said, my great weight had broken the bed. A quick demonstration of the powers of my new magic club convinced him.

Around noon we joined the great Highway, paved with red flagstone and shimmering in the sun. Here began the Marshes of Urunnar. Giant reed beds stretched as far as the eye could see. The Maruvians let this place stay wild so that raiders must follow the road or risk the terrors of the bogs – either way they will perish.

Just before nightfall we came to the first outpost of the Empire – a tall, wooden tower protected by a palisade and deep ditches. The five man garrison kept many horses corralled to provide fresh mounts for northerly bound couriers.

Here I met Urdnal of the Nose – swollen and crushed it is from many years of drink and brawls. We were once comrades in the Vth Eshak Scouts and he had stayed on as a corporal. We drank and reminisced a while and then joined the other travellers who sheltered overnight at the post. As we sat around the fire they confided their problems to me.

Mindstrainer Matthews of Watford told me of his time upon the **Emerald Isle**. *He had built a canoe there but could not sail the thing. In the past I have held converse with Michael, Great Lord of the Levels, and he revealed to me that the adventurer should drop his canoe at the shore, say 'In' or board the vessel – then simply travel where he will.*

Another had been trapped in a crumbling mine on the same island but could not prop up the ceiling with a handy post. Support is all you need.

Mindstrainer had discovered a magic word – 'x' he said. Alas, I hear that this is of no great use except as a red herring. It is only the echo of 'xyzzy', a spell in the **Colossal Adventure**.

A group had been bewildered in the town of Scarthorpe, home of the **Urban Upstart**. *Skinhead of Mordor grumbled that he could not kill the rats which infest parts of that dismal town. As far as I know, rodent extermination is not necessary to success. The cheese may help you escape imprisonment if eaten.*

Brak Beamish of Horsell gave us all some useful tips but, despite his knowledge, could not persuade the airport officers to let him through to his craft. Two things are necessary – any pilot must have the required papers to leave the town but also should brighten the officers' tedious day with a suitable bribe.

This was of no use to Lone Wulf of Fife who had not even been able to find any money, though he had traced the machine that dispenses it. People are careless, Wulf, and will drop the strangest things into dustbins and rubbish piles. Read all letters with care and your trouble may soon end.

El-Mokadem of Farnham made careful notes of what was said but asked where the flying suit might be. Perhaps it was left to dry on some pipes?

None of us could help Krusher Kreischer of 41A Dynevor Road, Skewen, Neath SA10 6TF. He was desperate to know how to remove a copy of the Quill from a safe in his **Murder Hunt**. *If you have the answer then write to him without delay!*

Also requiring your assistance is Thomas de Barri of 271 Larchville, Waterford, Eire. He covets the **Jewels of Babylon**. *He has braved many perils but cannot elude the cannibals, the crocodile or the octopus.*

As I went to look over the horseflesh at the corral I met Pranger Patel of Blakenhall. There are still very many of you who wish to breach the force field on **Planet of Death** *– he advised that all should reflect the field twice with the mirror and then dance. Others do say that the true route is to fire the gun twice before cavorting – try them both. This should assist Hugo of Oakham whose hair is greying with the task.*

Pranger also advised me that anyone can escape the prison by kicking the bar. Keep this piece of iron as it can be used later as a fuse. Go up to leave the cell. But Pranger could not use the lift to take his spacecraft to freedom – the High Priests of Artic tell me that button four on the control pad should do the trick. The clue at this place reads 'No Dusty Bin Rules'. Surely this means that 3 2 1 should be avoided? At all costs, say I.

Lady Susan of Chester overheard us and confessed that she had not even managed to find the laser gun. If she has a floorboard she may cross a ravine beyond the lake. There stands a hut and there within the gun.

At another fire Boyd the Bold boasted of his total success with **Valkyrie 17**. *He has also found that repeatedly opening and closing the safe will deliver an endless supply of necklaces and lethal boxes – but they are of no use! This meant little to Chris of Taggart whose problem was to find a use for a can of spray foam. It is not for whiskers, young sir, but can blind any spying eye, even if made of glass or metal.*

Now, my friends, I have received a hopeful plea from young Persevering Paul of 100 Benland, Peterborough PE3 8EE. Thus he writes: "Dear Gordo Greatbelly, I've been playing **Magic Mountain** *and can go no further. I have found two mazes and sought the exits in vain." Give this bard your valiant assistance – his gratitude will be unbounded.*

Ranger Reid collared me to claim his title of Lord High System Breaker. He says that he has completed **System 15000** *after many weeks of hacking. Should any of you wish to know the solution – telephone him. He would not reveal the true number except in code. Break it and the System's secrets may be yours:* $(7+c)(8+e)(7+a)(8+e)(7+a)$ $(6+i)(0+a)(8+e)(8+e)(1-b)$.

So we all fell asleep around the dying embers, though there were strange howlings from the marsh and the horses behind whinnied in fear. Til next moon, my fellow travellers, farewell.

Greatbelly

Gordo Greatbelly, Landlord

If you have a tale to tell, or are in need of a helping hand, write to the Landlord of the Dancing Ogre c/o Sinclair User, Priory Court, 30-32 Farringdon Lane, London EC1R 5BH.



Richard Price has fun in Dun Darach and escapes from a sunk submarine

ANYONE who has done some hitch-hiking or long distance travelling will know how it feels to arrive somewhere new and foreign — tired, broke, edgy and with nowhere to stay. It is always unsettling and frustrating not to know the local customs or how the natives will react to your outlandish behaviour and dress. It is ten times worse if you have no idea how you can raise some cash to survive a little bit longer.

If you have never experienced this first-hand you can still get a strong flavour of being on the road from **Dun Darach** — more a prequel than a sequel to Gargoyle's stunning **Tir Na Nog**.

Dun Darach

Cuchulainn, Irish myth-hero, remains the central character in the new game. This time it is not the sidhe-ridden afterworld he strides through but a city of living men, more medieval than mystic with its winding, maze-like streets and busy, preoccupied citizens.

After a hard day's fighting against his traditional enemies, the men of Connacht, Cuchulainn and his charioteer Loeg stop at a wayside inn for the heroic equivalent of a long cool pint of JC.

As they wait for their drinks in comes a very beautiful woman, asking if one of them will help her with the broken axle of her carriage. Loeg is severely smitten and leaps to her assistance.

When Cuchulainn comes out to watch he finds that one of his chariot-horses has been slaughtered and his charioteer kidnapped. Further enquiries reveal that Loeg has been abducted by Skar, a good-looking but entirely evil sorceress whose base is the Secret City of Dun Darach.

Dun Darach uses the same outstanding graphic format as its predecessor and is effectively a controllable animated cartoon. Cuchulainn and the scene around him can be viewed from different angles and he can be moved



left and right through the streets. He can enter houses, examine their interiors and collect objects. All actions are carried out by single key presses, with no text input.

The upper part of the screen shows the action with the remainder of the screen containing the compass indicator, list of possessions and the name of the quarter of the town you are moving through. Make no mistake, the city is large and bafflingly complex — although the streets are named, a map is essential.

You will find tradesmen of all kinds, private houses, temples, banks, gambling hells, police-like yeomen, pickpockets and honest citizens — though there don't seem to be too many of those. It is possible to get a job or make money by stealing your-



self — that is difficult as the yoemen are vigilant and you will need to find an Arthur Daley figure to fence the goods before you get caught.

Gargoyle admits its debt to the works of fantasy writers like Fritz Lieber and Michael Moorcock. The company has created a city which is alive and fascinatingly complex and you will find it all too easy to neglect your true quest in favour of exploring and hustling.

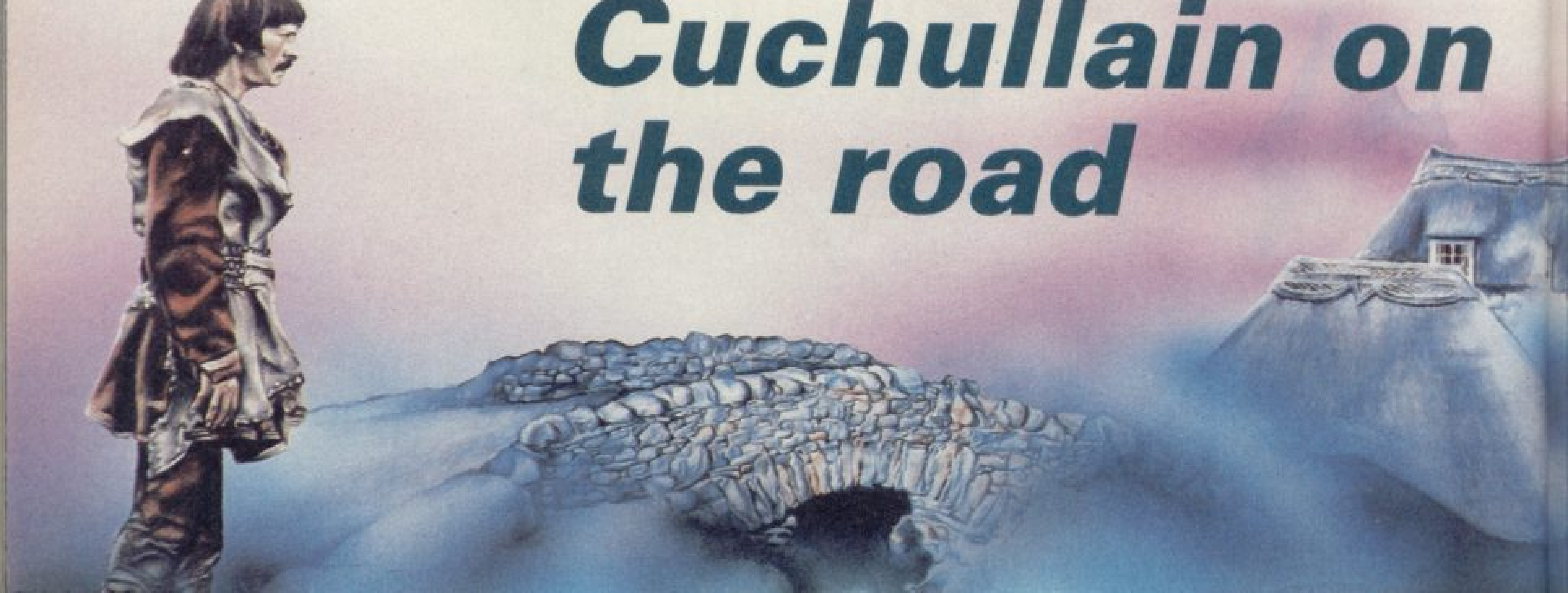
The game is less abstract than **Tir Na Nog** — though there are plenty of enigmas to solve — and identification with Cuchulainn is easy as you wander the sleazy pleasure quarter of Iomain or the warrens of the Dispossessed.

I enjoyed every compulsive minute of **Dun Darach**. It is definitely not a rehash of a successful format, though it has the same technical excellence and careful programming. If anything it is a lot more interesting and eventful than the earlier game, with equally superb graphics. Get it as soon as you can and let me know quickly where I can sell a fat black pearl or stash some stolen gold bars. Absolutely recommended.

Caesar's Travels

Caesar, the cheeky *Daily Mirror* cartoon cat, has appeared once before in a mouse-catching arcade game. Now he is the star of **Caesar's Travels**, described by the publishers as an ani-

Cuchullain on the road

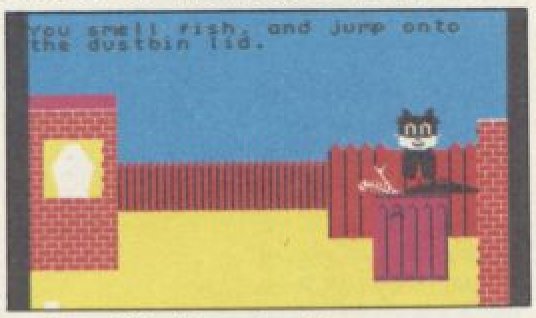


mated story program and intended to attract the three to nine age group.

The hand-outs with the program make great play of the educational benefits of the game and so it seems fair to look at it as an aid to learning.

The game is basically an option adventure with the animated figure of Caesar walking through various scenes looking for a new home — he has been kicked out by his disgruntled owner Mr McGregor for smashing too much crockery in his pursuit of mice.

Each location is a full screen picture with text written above. There are six main options but no more than two appear on each screen. You may decide, for instance, to jump over a



wall or hide in a dustbin.

There are 38 routes through the game and 18 different endings, all happy and non-violent — a point in the game's favour.

The graphics are bright and cheerful, very similar to the style of the earlier arcade game. However, Caesar flickers as he moves and the attributes tend to clash. Despite that, the cat is an appealing figure for children.

I am not sure that **Caesar's Travels** is successful as an educational tool as there are a number of inconsistencies which may only serve to confuse younger children.

At one point Caesar is disturbed in the night by a posse of alley cats. The player is asked to count the cats in the picture, but the other cats are depicted only as pairs of eyes glowing in the night. Even if you work out that those are the enemy cats you are not allowed to count Caesar who is the only really visible cat. Here then, you are expected to look through Caesar's eyes.

In contrast, at another decision point, you are given the option of going left or right. If you try to do this from the cat's viewpoint you will be told you are wrong.

Dead at the Controls

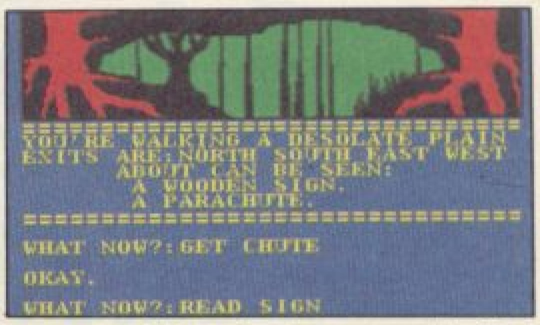
Artic's adventures have tended to follow a style which is straightforward and without frills. Apart from the addition of graphics, the last adventure **Eye of Bain** was very much in the same vein and none the worse for it.

When I received a pre-production version of **Dead at the Controls**, I expected to find a tight but competent text game with added graphics. After an hour or so of play I found myself pretty disappointed.

You are the captain of a spaceship which explodes over a strange new planet. Heroically leaving the crew to their fate you parachute to earth to discover some means of escape.

Wandering through the jungle, you find a teleport device in an Aztec city — hang on, what's this about Aztecs, arent we supposed to be on a strange new world? Oh well . . . The teleporter will take you to several unrelated locations where you should be able to collect the various bits of a spacesuit. That's about it.

Despite fast, attractive graphics — some repeated several times for different locations — the game lacks atmosphere. Anything which is not directly relevant to the solution has no real existence — examining things like rock cairns inevitably results in the



response, 'You don't see much'. The world offers no opportunity for diversion and ends up as a bleak, unstimulating environment. The descriptions are minimal.

If the review version of **Dead at the Controls** resembles the final production copies then, sadly, the game is nowhere near Artic's usual standard.

Subsunk

This month's final offerings are both produced by Firebird and written with the **Quill**. The first is **Subsunk**.

You are Ed Lines ace reporter for the trade rag *Seafaring Gazette*. Your

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assignment, to seek out the truth of life in a nuclear submarine, has run into deep trouble. A foreign power has attacked the sub, captured the crew and scuttled the vessel.

Your only way to safety will be to rig up some sort of aerial and send a distress message to Headquarters.

There are fast, bright graphics for many of the sub's numerous compartments, the occasional sound effect,



and a friendly interpreter which gives information about even useless items. Add a few wry jokes and you have an enjoyable adventure.

You have to devise a way not only to sort out the radio link but also to send up the aerial on a float. One slip and you will depressurise.

I was initially put off on reading the cassette notes and thought I was in for another dose of rather dreary escaping. Not so, as the sub is interesting enough to take your mind off the lack of other creatures. Well designed and thoroughly enjoyable escapism.

The Helm

The Helm confers immortality on its wearers. The current owner is the local, evil Lich but he does not have all the pieces of the sacred headgear. Without all the bits he cannot become an eternal Lich so it is up to you to find the remaining disguised portions and enter the wicked one's castle. There you can steal the final piece. The Lich will not take kindly to this.

The game is text only and composed in medieval script which is occasionally difficult to read. The interpreter's responses are servile and sometimes long-winded — instead of 'What next?' you get 'What would you have me do next, Your Brillianceness?'.

The text scrolls up the screen in different colours and has a startling kaleidoscopic effect. Despite that the descriptions and general information are quite full and there is a fine tongue-in-cheek approach to the business of magical adventure.

There is a wide range of deduction problems ranging from the traditional crossing of the ravine to defeating a mesmerising Psyak — which manifests itself as a ball of light.

As far as I am concerned, Firebird can carry on bringing out programs like these. They both show that text adventures can be fun without having to be self-important in attitude.

Dun Darach
Publisher Gargoyle Games
Memory 48K **Price** £9.95
★★★★★

Caesar's Travels
Publisher Mirrorsoft
Memory 48K **Price** £7.95
★★

Dead at the Controls
Publisher Artic
Memory 48K **Price** £6.95
★★

Subsunk
Publisher Firebird
Memory 48K **Price** £2.50
★★★★

The Helm
Publisher Firebird
Memory 48K **Price** £2.50
★★★★





Can the ghost of Christmas Past be laid to rest? Bill Scolding meets the exorcists



Jan and John Peel: turkey busters

LEAD-BLACK clouds are massing in the east as we draw up outside the innocent looking offices of a suburban building society. I feel the hairs rise on the nape of my neck.

Through a shabby unmarked door, down an unlit alleyway and up the creaky staircase. All too quickly we are ushered into the presence of the Peels, the obsessive genius and his insanely loyal wife, who together created the infamous House of Legend and unleashed its power upon an unsuspecting world.

John Peel — techno-freak and dedicated eccentric — rises to greet us. His eyes lurk behind glasses thick as the bottoms of milk bottles, his chin boasts a fluff of a beard, his head a receding wisp of hair. He talks and smokes incessantly.

Jan Peel, long dark hair and a wide grin, keeps John in check, curbing the excesses of his indiscriminating gossip. As managing director she is very much in control, coping with administration, sales and generally maintaining contact with the real world; while John, head of software, indulges in the flights of fantasy which eventually see the light of day as Legend games.

Pleasantries over, Peel is immediately on the attack. "I have to tell you that I was Very Angry when I saw your little piece in the May issue."

Oh God, Gremlin's got it wrong again. Nothing else for it but to brave the storm . . . "All that rubbish about hiring a country mansion for the programmers," Peel continues. "Totally untrue." He waves his arms about, taking in the small office, the cartons stacked against the wall, the overflowing desks and ashtrays.

"We didn't set out to con or hype anyone with TGSR." TGSR — **The Great Space Race**, a game you didn't so much play as sit back while it played with itself. Launched just before Christmas, it got a thumbs down from the press, bombed in the shops and left distributors howling.

"The programming team ran for cover. We brought in a new team which spent three weeks of sleepless nights trying to get the shambles working for the deadline," Peel explains. "But we let our main distributors see it, giving them the chance to cancel or reduce their orders. They were greedy and thought the game would sell anyway.

"Now we're offering **Komplex** at reduced price to all those kids who bought TGSR and weren't happy with it. And we've done deals to bail out distributors of all unsold copies. We didn't have to, but we wanted to regain credibility. We lost over £200,000 on the game." On the office wall a TGSR poster looks down, the curse which might have brought about the fall of the House of Legend.

Peel lurches to his feet. "Come on, let's see what Software is doing." Up another flight of stairs to the garret of Dave Ashe, artist, punk. All in black, with studded black belt, black and yellow hair, Ashe looks like a healthy Ian Dury. He designs all the on-screen graphics, the advertisements, posters and logos, although Jan Peel retains close creative control. Complicated geometric shapes spiral across his sketch pads and mouse-driven design screens, the rough layouts for the Komplex trilogy.

Ashe creates the images on a customised BBC and they are then transferred, via heavily expanded BBCs used by the programmers next door, to the Spectrums and Commodores. Peel enthuses about the detail of the graphics. "A full set of frames, for one rotating object moving towards you, can take 24 frames or more depending on flicker and over three days to draw."

At present the team is working on **Komplex City**, part two of the trilogy, due to be on sale at the end of June. "Each game is complementary to the others, though different," says Peel.

Legend of the haunted house

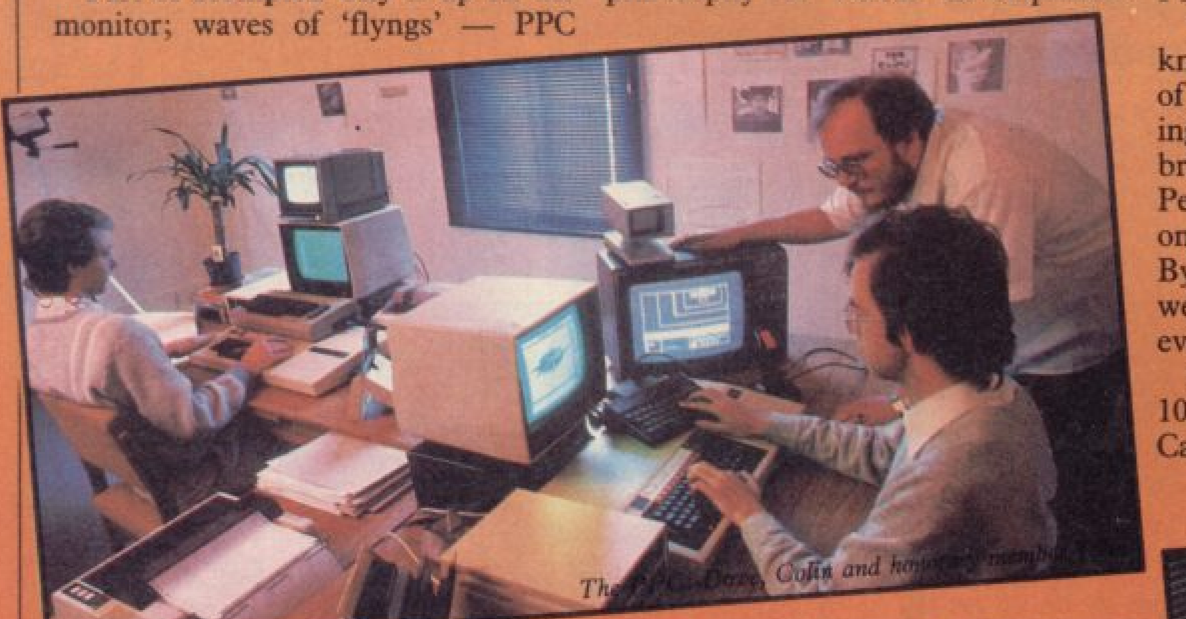
"In a sense **Komplex City** should have been launched first. It's the fastest of the games and involves less map-making."

Nevertheless, the program has the potential for a mind-boggling quantity of maps, running into trillions. Peel explains, "Each map has a 12-character name, and as there are 37 possible characters — including the alphabet and numerals — then there are 6,500,000,000,000,000,000 maps which can be generated." Hmm.

We move into the programming den, known as the PPC — the Perverts and Pillocks Club — where Colin Foster and Dave Ebsworth sweat out their days over the keyboards.

Ebsworth is fresh-faced and straight from school; Colin, older but just as clean, with an MSc in concurrent operating systems. Like Ashe, both sport Komplex T-shirts. For our benefit, or is it a house rule?

Part of **Komplex City** is up on the monitor; waves of 'flyngs' — PPC verbal shorthand for flying things — hurtle down wireframe tunnels. Every now and then a docking screen appears, 'an assortment of interesting gratuitous garbage', as Peel puts it, although it is not gratuitous at all. It can replenish your energy levels and hyperspace drive, or deplete them further if used incorrectly.



The PPC — Dave, Colin and

Docking in **Komplex City** is easier than in **Komplex**, apparently due to criticism that it was too difficult in the earlier game. Other improvements include a real-time clock. A scrolling database keeps track of where your targets are in the labyrinth.

The shelves around the room are crowded with boxes of discs and ring binders, fat with code listings — the debris of **The Great Space Race**. "Over £1000 of discs were used," moans Peel. "Most of it had to be junked."

Was the game too ambitious? Colin Foster pauses, creating the impression that he is considering this for the first time. "From what I've seen the programmers weren't up to it." Peel has no such reservations. Brandishing a carton he exclaims, "That's how professional they were. They were using microdrives!"

Will the ghost of TGSR ever be laid to rest? Peel puts on a brave face. "As a result of TGSR we came up with the philosophy of visible development. Every day, if not every hour, progress can be seen." In other words, you don't leave it until the last minute to discover you've hatched a turkey.

The Legend offices are crammed full of hardware. Not just keyboards, drives and screens, but extraneous equipment too — miniature TVs, complicated cameras. Spectrums are in abundance — "They tend to break down a lot," mutters Peel — but not an Amstrad or MSX to be seen.

"We're not bothering with them," says Peel. "It is mostly second league software houses which are jumping for the Amstrad because they can't compete with the first leaguers on the Commodore and Spectrum. We've had Amstrad around here pestering us to do things. We'd license products to them for conversion but for us it's not economic."

And the QL? "I wouldn't touch it, mainly because I don't know anybody who's got one," Peel says and then adds, "Oh, except one of the TGSR programmers — which says a lot."

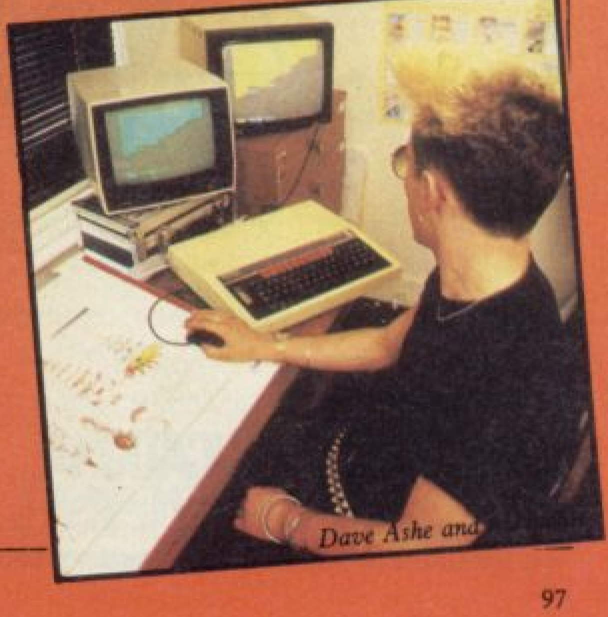
We leave the black-garbed PPC and go for lunch. The sky too is black now and the air is heavy.

Several glasses of wine later we are treated to a potted history of the Peels. In the years BC — Before Computers — John Peel hacked it as a freelance hi-fi journalist. "Faced with my 92nd article on how to choose a record deck I realised I was burnt out," says Peel.

Was he ever confused with the well known disc jockey? "Oh yes, got lots of fan mail — and some very interesting phone calls. One magazine had the bright idea of a 'John Peel meets John Peel' article. I met the guy, didn't get on with him, so we got drunk instead. By the time the photographer arrived we were plastered. Worst photographs ever taken."

Peel's first computer was a CBM 100 followed by a UK 101. When Casio launched its handheld micro

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Dave Ashe and

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Peel produced the English manual.

Peel formed MiCROL in September 1981; it was a bread and butter operation, selling spreadsheets and databases for portable computers. "We knew the Spectrum was coming, and the first MiCROL Spectrum ads appeared the week of the press launch. We didn't realise games were going to be big but around Christmas '82, when Quicksilva was advertising its games, we knew it was the time for games. We decided to go for an adventure as the only professional adventure at that time was **The Hobbit**.

"**Valhalla** was masterminded from a one-bedroom flat in Purley," Peel continues. "It took three man years to write, starting in March '83, and was ready in October. We didn't try to contact any distributors; they had to work hard to find us."

Jan Peel designed the adverts, wrote the manual and did the imaging for the characters in **Valhalla**. An ex-nurse, working in a boys' school, she met John Peel through an ad placed by her friends in the lonely hearts' pages of *Time Out*. They arranged to meet; Jan would be driving her red Mini, John would be waiting on the corner. "I got in, talked to the lady. We got on fine," Peel laughs. "Trouble was, it was the wrong red Mini . . . Jan had got lost."

And now they drive a Porsche.

What do they feel of recent animated adventures, other computer movies? "We coined the phrase 'computer movie'," says Peel. "Imitation is the sincerest form of flattery. There are some products which command real respect, like **Tir Na Nog**. I greatly respect Ultimate's work. I thought I was going to like **Skool Daze**, but it was too complicated."

Jan Peel agrees. "It had great detail. I look at the characters, how they move. But," she confesses, "I hate most games. So many are too difficult to get into. **Strangeloop** is a good example of that type of game."

"Perhaps **Komplex** is too," adds Peel. "It's difficult striking a balance between the learning curve and game richness."

What about **Valhalla 2**? When will that be released? Peel is cagey. "The true follow-up will come later in the year — another computer movie." Will it include icons? Peel dictates slowly, "You can say, 'From what Peel said I suspect that it is likely that **Valhalla 2** will consist of mixed icons and text.' " Thank you, John.

There is a sudden crack of thunder and a flash of lightning is reflected in Peel's glasses. "Right at this minute," he intones, "I can tell you what my team is doing. They're furiously making back-up copies to avoid mains glitches getting through our power smoothers."

Now there is a wall of rain outside. The conversation grows darker, and Peel holds forth on the evils of designer drugs and Santa Claus politics. Drugs form the background to *The Novel* he is writing, an apocalyptic vision of the future about which, after heavy hints from Jan Peel, he is unnaturally reticent. The rain pours down.

We leave the Peels and their haunted house in a hot black summer storm. The PPC are still beavering away over their machines, Dave the punk is drawing cabbalistic signs with his mouse, John Peel is wandering about in a wreath of cigarette smoke, the invisible albatross of **The Great Space Race** about his neck, and Jan Peel is smiling, in control. The Legend goes on . . .

Graphics with Style



Graphics pads and style interfaces to be won in our Saga Systems competition

THE PRIZES

BE YOUR OWN computer artist with a terrific package from Saga Systems of graphics tablet, interface and graphics software. The GP graphics tablet plugs into the Style interface and allows you to draw pictures on the tablet with the included light pen.

Style incorporates both interface and software. The interface contains an analogue to digital converter which allows signals such as those generated by GP to be converted. It doubles as a Kempston compatible joystick interface, which means that you can use a joystick to drive the software if you don't have the graphics tablet.

The software has all the standard features, such as fill and circle commands, freehand or straight-line drawing, as well as rubber-band boxes and triangles.

Saga Systems is giving away four prizes of the graphics tablet plus Style, and 10 runners-up prizes of Style on its own. With GP selling at £79.95 and Style at £29.95, that makes a grand total of over £730 worth of prizes for the lucky winners. Moreover, everyone who enters will receive a £2.00 voucher redeemable on Style and a £5.00 voucher for GP, if bought direct from Saga Systems.

THE PUZZLE

ALIENS are broadcasting a message to Earth. The message consists of 341 pulses, some short, some long. Converting the pulses to noughts and ones, you get a string of binary digits, printed below. They could be computer graphics, so you draw a grid and decide to fill it in — a space for zero and a black square for one.

Calculate what sized rectangular grid you need to hold exactly 341 cells, and then fill it in. A message will appear, and a clue to the alien home planet. Write the name of the planet and the message, together with your name, address and telephone number, on a postcard and send it to Sinclair User, Priory Court, 30-32 Farringdon Lane, London EC1R 3AU by Friday, August 16.

The first four correct entries pulled from the mailbag after that date will win the Saga GP graphics tablet and Style. The next 10 will receive copies of Style only. Employees of EMAP or Saga are not eligible. Only one entry per person is allowed.

000000110001100010111110010100101110010101001001000100001011011000101
010100100100010000101011100010101010010010001000010100110001011000110
001000100001010010111000000000000000000000000000000001000111110111110100
0101000111111110100000000100001010010001000010001111100010000010001000
110001000000010001000001000100010000000001111100010000010001110111



Defeating the ZX attributes

Andrew Hewson explains why colour clash occurs in the Spectrum screen display

IT IS NOW rather more than three years since *Sinclair User* was launched. I have been writing Helpline since then and it has been interesting to observe the development in the type of problems that you have asked about.

The majority of questions now concern the ZX Spectrum, and more sophisticated than before. I have tried to reflect that. I have, for example, written several times in recent months about controlling the interrupt system, a topic which I would not have considered in the early days.

However, every now and again I get a flurry of letters concerning fairly straightforward topics and so this month I answer a few of those. Interrupt fanatics also get a bit more information at the end of the article.

Vipin Abrol writes from Kapurthala in the Indian sub-continent: **I bought a Spectrum recently and the person who sold it said it was a 64K machine, but I did not know that a 64K version was manufactured. How can I find out how much memory there is?**

The Spectrum has been manufactured only in 16K and 48K versions and the Spectrum Plus only in a 48K. I suspect that the machine in question is really a 48K version because it would then contain 48K of RAM which, when added to the 16K of ROM present in all Spectrums, would yield the 64K value claimed by the salesman.

The way to settle that is to look at the value of the P—RAMT system variable which is held at address 23732 and 23733. A 48K machine, when first switched on, will have the contents of both addresses set to 255 so that entering

PRINT PEEK 23732, PEEK 23733

will result in the following being PRINTed:

255 255

The first value will be the same for a 16K machine but the second will be 127.

If you want the Spectrum to do all the work then enter the following:

PRINT "This is a"; (PEEK 23733 + 1) / 4 – 16; "K Spectrum."

The second letter comes from Tony Braverman of Cambridge. **I cannot understand the Spectrum attributes problems which occur when I use** The Illustrator **program. Instead of clearly defined areas of colour I get character squares of colour intruding into previously filled areas.**

There is nothing you can do about that kind of 'error' because it is an inherent feature of the Spectrum design. To understand the reason why the machine was designed in this way it is necessary to think about the problems associated with producing a screen display.

The basic requirement of any computer screen display is that it should be capable of showing letters and digits in a single colour on a uniform background of a second colour. The ZX-81 fulfils that function by displaying black characters on a white background. Up to 32 characters on each of 24 lines are permitted and as each character requires one byte of memory storage that means that at most 768 bytes of memory are required to store the information displayed. The ZX-81 also uses one byte per line to mark the end of each display line so that the so-called display file occupies a total of 792 bytes of memory.

> ***"How do you POKE into the ROM so that you can do fancy letters?"***

A monochrome, character-only, display is very limiting and so when Sinclair produced the Spectrum the company decided to introduce a high-resolution screen. In the arrangment selected each screen character is made up of an 8×8 grid of pixels and the status of each pixel — being either on or off (that is either displayed or invisible) — is determined by the status of a corresponding bit in a byte in the display file. As there are eight bits in a byte each character requires eight bytes of corresponding memory.



● Please address problems and queries to Andrew Hewson, Helpline, Graham Close, Blewsbury, Oxfordshire.

The Spectrum, like the ZX-81, can display 24 lines of 32 characters and so the Spectrum display file contains 8 ★ 24 ★ 32 = 6144 bytes. It is nearly eight times bigger than the ZX-81 equivalent. Note that the 6144 bytes contain only enough information to produce a two-colour high resolution display. A pixel which is illuminated appears in the background colour — usually white — and a pixel which is not illuminated appears in the foreground colour usually black.

The obvious way for the manufacturers to create a colour display is to allow each pixel to appear in one of several colours but a quick calculation shows that this demands a great deal of memory. Suppose that a four-colour display was to be provided. Each pixel would then require two bits to store its status because two bits can together be set in any one of four states — both on, on and off, off and on, both off. Thus a four-colour display requires twice as much memory as a two-colour display.

An eight colour display requires three bits per pixel. If Sinclair had attempted to do that a total of 3 ★ 6144 = 18432 bytes would have to be devoted to the Spectrum display, more than the entire RAM space in the original 16K machine.

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To avoid that large memory requirement the manufacturers opted to use a low resolution colour system based on character squares. Under the system the colour of each character square in the display is controlled by a corresponding byte in the so-called attributes file.

Each square can be set to any one of eight foreground colours — the INK — as determined by three of the bits in the corresponding byte, and any one of eight background colours — the PAPER — as determined by a further three bits in the corresponding byte. The two remaining bits in the byte determine the FLASH and BRIGHT status of the square. That ingenious system allows an eight colour display to be generated using a further 768 bytes only — one byte for each of 32 characters on 24 lines.

The disadvantage of this economical use of memory is, as Tony has found out, that it can be difficult to lay out a colour picture on the Spectrum screen. The scale of the problem depends on the type of picture which you wish to create. Cartoon images, for example, can usually be adapted to match the low resolution colour boundaries. With a more sophisticated picture it may be worth sacrificing colour altogether so as to produce the right effect.

The output of successful Spectrum games companies is worth studying because they make their living from producing images which are pleasing to the eye.

Pyjamarama from Mikro-Gen is a good example of cartoon work designed with the Spectrum low resolution colour screen in mind. The player is more or less unaware of a colour problem except when the moving figure passes across an object in the background. Ultimate, on the other hand, has opted in recent months for a system where the game is played in monochrome only with a small amount of peripheral colour decoration.

The Spectrum compromise is not unreasonable for an inexpensive home computer because it enables an eight-colour display at a good resolution to be generated from only 6K of memory. That compares well with the 16K required by the Amstrad for a four-colour display of rather better resolution and up to 20K required by the much more expensive BBC. The only machine which can fairly claim to do distinctly better in performance in this area, for a comparable price, is the Commodore 64.

The low memory requirement of the Spectrum has another particular advantage which I doubt if the manufacturers considered when they were designing the machine, but is of particular importance for a games machine. It is that the display file, being small, can be up-dated quickly so that, all other things being equal, there is more scope for hectic screen activity. It is a point which proponents of large sophisticated display systems often overlook.

```
10  INPUT " ENTER BASE ADDRESS FOR NEW CHARACTER TABLE " ; X
20  LET Y = 256 + PEEK 23606 + 256 * PEEK 23607
30  FOR I = 0 TO 767
40  POKE X + I , PEEK ( Y + I )
50  NEXT I
60  LET X = X - 256
70  POKE 23607 , INT ( X / 256 )
80  POKE 23606 , X - 256 * INT ( X / 256 )
```

Figure 1. A Spectrum program to copy the character table to a new location determined by the user.

The next question also concerns the Spectrum display. Andrew Sumpter of Worksop asks: **How do you POKE graphics into the ROM so that you can do fancy letters automatically?**
It is not possible to POKE a number into the Read Only Memory — ROM — or, to be more precise, you can try but it will make no difference because the number will not be retained. Thus it is not possible to change the character set stored in the Spectrum ROM.

Fortunately, the Spectrum does not access its character set directly. Instead there is a system variable called CHARS stored at address 23606 and 23607 which points to the address of the beginning of the character set. Thus the way to create fancy letters is to create a new character set in RAM and then alter the CHARS system variable to point to the new set.

There is one pitfall to avoid. It is no good changing the system variable before the new character set is created and is in place because all the characters written to the screen will be unintelligible and you will lose control of the machine. To see the problem in action try the following:

LET A = PEEK 23607
POKE 23607,0

All items PRINTed subsequently will appear as a mass of smudges making the screen look like old blotting paper. In principle the situation can be restored by entering

POKE 23607,A

Doing so can be quite tricky!

Hence the most practical way to create your own character set is to copy the original into RAM and then modify the copy by one character at a time. The Basic program in figure one shows how the copying can be done.

One final point is that the CHARS system variable does not point directly to the base of the character set itself but to an address 256 bytes earlier. Therefore the address of the base of the character set is given by the formula:

PRINT 256 + PEEK 23606 + 256 ★ PEEK 23607

The arrangement is not as strange as it sounds because the first 32 characters in the set are not PRINTable and therefore there is no entry in the table for them. Each character requires eight bytes for its definition and so the first 8 ★ 32 = 256 bytes are 'missing' from the table.

Finally, as promised, a quick answer for those readers interested in the interrupt system. It is prompted by a letter from Patrick Norris of Worthing. He points out that: **Use of interrupt mode two with extra hardware connected will cause a program to crash. Why?**

Patrick's problem is based on a slight misunderstanding. Interrupt mode two is specifically designed to allow external hardware to direct the execution of the Z80 microprocessor. It does so by providing half the data for the address of the interrupt service. Up to 128 interrupt routines can be accommodated, each one tailored by the programmer to the needs of the interrupting hardware.

The Kempston joystick puts out different values depending on the setting of the joystick. It is necessary for the programmer to ensure that he places interrupt vectors at the appropriate places in RAM to cope with the situation.

THE Gilbert Factor has been replaced by a star rating, the basis of which is value for money. Programming, graphics, speed, presentation and addictive qualities are taken into account.

Guide to ratings:

★★★★★24 carat. Buy it
★★★★Value for money
★★★Nothing special
★★Over-priced
★A rip-off

SPECTRUM 16K

Adventure

Planet of Death	Artic	3★

Arcade

Arcadia	Beau Jolly	3★
Arcadian	J K Greye	3★
Black Hole	Quest	3★
Blind Alley	Sunshine	4★
Cosmic Guerilla	Crystal	4★
Crazy Cranes	Voyager	3★
Crevasse and Hotfoot	Microsphere	4★
Cyber Rats	Silversoft	4★
Death Chase	Micromega	3★
Earth Defence	Artic	3★
Escape	New Generation	4★
Fireflash	Abacus	3★
Fruit Machine	DK'tronics	3★
Galaxians	Artic	3★
Gnasher	Mastertronic	2★
Godzilla and Martians	Temptation	4★
Ground Attack	Silversoft	3★
Horace and the Spiders	Sinclair	4★
Horace Goes Skiing	Sinclair	3★
Hungry Horace	Sinclair	4★
Invasion Force	Artic	4★
Jet Pac	Ultimate	5★
Luna Crabs	Micromega	4★
Maze Chase	Hewson	4★
Meteor Storm	Quicksilva	4★
Meteoroids	DK'tronics	4★
Micro Mouse	Lothlorien	3★
Millypede	Add-on	4★
Mined Out	Quicksilva	4★
Mr Wong's Loopy Laundry	Artic	3★
Muncher	Silversoft	3★
Orbiter	Silversoft	4★
Pengy	Micromania	2★
Planetoids	Sinclair	3★
Proteus	Abacus	3★
Rider	Virgin	3★
Road Toad	DK'tronics	4★
Sentinel	Abacus	4★
Sheer Panic	Visions	4★
Sir Lancelot	Melbourne House	4★
Space Intruders	Quicksilva	4★
Space Raiders	Sinclair	3★
Spec. Scramble	Work Force	4★
Spectipede	Mastertronic	3★
Spectral Invaders	Bug-Byte	4★
Spectral Panic	Hewson	3★
Strike Four	Spectresoft	2★
Tank Battle	dk'tronics	4★
Train Game	Microsphere	5★
Winged Warlord	CDS	3★
Yomp	Virgin	4★

Business

Finance Manager	OCP	5★
Statistics II	Bridge	1★
Survey II	Lobos	3★
Vu-Calc	Sinclair	4★
Vu-File	Sinclair	4★

Education

Chess Tutor	Artic	4★
Estimator Racer	Psion	4★
Firework Music	Soft Cottage	4★
Integration	University	4★
Money	Poppy	4★
Number Painter	Psion	4★
Regression	University	4★

Language

Beta Basic	Betasoft	5★

Practical

Countries of the World	Hewson	4★
Cycle Planner	Medidata	2★
Map of the UK	Kuma	4★

Puzzle

Flippit	Sinclair	4★
Hanoi King	Contrast	4★
Lojix	Virgin	2★
Nowotnik Puzzle	Phipps	4★

Simulation

Air Traffic Controller	Hewson	3★
Airliner	Protek	3★
Golf	Virgin	4★
NightFlite	Hewson	3★
Print Shop	CCS	4★
Pro-Golf	Hornby	4★

Strategy

Dallas	CCS	3★
Dictator	DK'tronics	4★
Heathrow	Hewson	4★

Traditional

Bridge Tutor	CP Software	4★
Bridgemaster	Serin	5★
Las Vegas	Temptation	3★
Pool	Bug-Byte	4★
Reversi	Sinclair	4★

Utility

Auto Sonics	Buttercraft	3★
Basic Utilities	Jaysoft	3★
Dietron	Custom	3★
Disassembler	DK'tronics	4★
Editor/Assembler	Picturesque	4★
Extended Basic	CP Software	4★
FP Compiler	Softek	5★
Friendly Face	Monitor	4★
Letterfont	Allanson	4★
Machine Code Test Tool	OCP	4★
Master Toolkit	OCP	4★
MCoder	PSS	4★
Print Utilities	Sinclair	4★
Slow Loader	ELR	5★
Sound FX	DK'tronics	3★
Spec. Editor/ Assembler	Picturesque	4★
Spec. Monitor	Picturesque	4★
Spectrum Super Toolkit	Nectarine	4★
Supercode	CP	4★
Trace	Texgate	4★
TT-S	Timedata	4★

SPECTRUM 48K

Adventure

Abyss	CCS	3★
Adventure 1	Abersoft	3★
Alchemist	Beau Jolly	4★
Amulet	Sentient Software	2★
Ashkeron	Mirrorsoft	3★
Assignment East Berlin	Sterling Software	2★
Atlas Assignment	Virgin	4★
Black Crystal	Mastervision	4★
Black Planet	Phipps	4★
Bored of the Rings	Delta 4	5★
Castle Blackstar	SCR	4★
Classic Adventure	Melbourne House	4★
Colditz	Phipps	4★
Colossal Caves	CP Software	4★
Confidential	Radar Games	4★
Crystal Frog	Sentient Software	3★
Curse of the Seven Faces	Imperial Software	3★
D. Mouse in Black Forest	Creative Sparks	4★
Demon Lord	MCE	3★
Detective	Arcade	4★
Diamond Quest	CCS	2★
Diamond Trail	Gilsoft	4★
Doomdark's Revenge	Beyond	5★
Dungeon Master	Crystal Comp.	4★
Dungeons of Doom	Temptation	2★
El Dorado	Atlantis	4★
Emerald Isle	Level Nine	4★
Erik the Viking	Level Nine	4★
Espionage	Modular Resources	2★
Espionage Island	Artic	3★
Eureka	Domark	3★
Everest Ascent	Shepherd	3★
Eye of Bain	Artic	4★
Fantasia Diamond	Hewson	4★
Flight from the Dark	Hutchinson	4★
The Fourth Protocol	Century/Hutchinson	5★
Frankie goes to Hollywood	Ocean	5★
Frog Face	Positive Image	4★
Ghoulies	IMS Software	4★
Golden Apple	Artic	4★
Gremlins	Adventure Int	3★
The Great Space Race	Legend	2★
Halls of Things	Crystal Comp.	5★
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Here comes the sun	Alligata	4★
Heroes of Karn	Interceptor	3★
Hobbit	Melbourne House	5★
Ice Station Zero	8th Day	3★
Inca Curse	Artic	3★
Inferno	Shepherd	4★
Invincible Island	Shepherd	4★
Island	Crystal	2★
Jericho Road	Shards	4★
The Jewel of Power	Slogger Software	4★
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Jungle Adventure	CCS	2★
Kentilla	Micromega	3★
Key of Hope	Games Workshop	4★
King Arthur's Quest	Hill MacGibbon	2★
Knight's Quest	Phipps	3★
Leopard Lord	Add-on	2★
Lords of Midnight	Beyond	5★
Lords of Time	Level Nine	4★
Mad Martha	Mikro-Gen	4★
Malice in Wonderland	Sentient Software	3★
The Magic Sword	Database Pubs	3★
Mountains of Ket	Incentive	4★
Murder at Manor	Gemtime	4★
Odyssey of Hope	Martech	3★
Oracle's Cave	Doric	4★
Orc Slayer	Gamma Software	3★
Paradox	Runesoft	1★
Perseus and Andromeda	Channel 8	4★
Pimania	Automata	4★
The Prince	CCS	4★
The Prisoner	Spoof Software	3★
Project X	Compass Software	4★
Quest	Hewson	4★
Quetzalcoatl	Virgin	4★
Return of the Joystick	Delta 4	3★
Return to Eden	Level Nine	4★
Runestone	Games Workshop	4★
Runes of Zendos	Dorcas Software	3★
The Sandman Cometh	Star Dreams	4★
Satan's Pendulum	Minatron	4★
Scoop	Sentient Software	3★
Se-Kaa of Assiah	Mastervision	2★
Sherlock	Melbourne House	5★
Ship of Doom	Artic	4★
Snowball	Level 9	5★
Spoof	Runesoft	4★
Superspy	Shepherd	3★
System 15000	Craig Comm.	5★
Temple of Vran	Incentive	4★
The Final Mission	Incentive	4★
The Talisman	Games Workshop	4★
The Wild Bunch	Firebird	2★
Tir Na Nog	Gargoyle	5★
Titanic	R&R	3★
Tower of Despair	Games Workshop	3★
Transylvanian Tower	Shepherd	3★
Twin Kingdom Valley	Bug-Byte	4★
Underworld	Orpheus	3★
Urban Upstart	Shepherd	4★
Valhalla	Legend	5★
Vampire Village	Terminal	2★
Velnor's Lair	Quicksilva	4★
Volcanic Dungeon	Mastervision	3★
War of the Worlds	CRL	2★
Waydor	IMS Software	2★
Width of the World	Mosaic	2★

Arcade

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A View to a Kill	Domark	4★
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Airwolf	Elite	2★
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Alien 8	Ultimate	5★
Android Two	Vortex	5★
Ant Attack	Quicksilva	5★

Archon	Ariolasoft	2★
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Armageddon	Silversoft	2★
Astronut	Software Projects	4★
Atic Atac	Ultimate	5★
Automania	Micro-Gen	3★
Avalon	Hewson	5★
Base Invaders	Work Force	3★
Battle Zone	Quicksilva	3★
Bazam	Alan Firminger	3★
Beach Head	US Gold	4★
Bear Bovver	Artic	4★
Birds and Bees	Bug-Byte	4★
Black Hawk	Creative Sparks	4★
Blade Alley	PSS	3★
Blue Max	US Gold	3★
Blue Thunder	Foundry Systems	3★
BMX Trials	Lainlan Software	2★
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Bruce Lee	US Gold	4★
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Buzz Off	Electric	3★
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Carpet Capers	Terminal	3★
Cauldron	Palace	5★
Cavelon	Ocean	4★
Centipoid Plus 3	Orwin	3★
Chaos	Games Workshop	4★
The Chocolate Factory	Hill MacGibbon	3★
Chequered Flag	Sinclair	5★
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Chuckie Egg	A & F	5★
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Chuckman	CCI/Add-on	4★
Close-In	Pulsonic	2★
Codename Mat	Micromega	5★
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Crusoe	Automata	3★
Cyclone	Vortex	4★
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Death Chess 5000	Artic	4★
Death Star Interceptor	System 3	1★
Defusion	Incentive	3★
Defusion/Worms	K-Tel	2★
Demon Chase	Mansfield	2★
Deus Ex Machina	Automata	5★
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Exodus	Firebird	2★
Falcon Patrol II	Virgin	3★
Falklands Crisis	Lainlan Software	2★
Fantastic Voyage	Quicksilva	4★
Frank N Stein	PSS	4★
Fred	Quicksilva	3★
Froot Loop	NTD Software	3★
Galaxy Attack	Sunshine	2★
Ghostbusters	Activision	4★
Ghost Rider	Positive Image	2★
Giant's Revenge	Thor	2★
Gift from the Gods	Ocean	3★
Gilligan's Gold	Ocean	3★
Glass	Quicksilva	4★
Glug Glug	CRL	3★
Havoc	Dynavision	1★
Harry Goes Home	Pulsonic	3★
Helichopper	Firebird	2★
Hellfire	Melbourne House	4★
Herbert's Dummy Run	Mikro-Gen	4★
Hickstead	CCS	2★
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Hunchback	Ocean	4★
Hunchback II	Ocean	3★
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Jasper	Micromega	3★
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Knight Lore	Ultimate	5★
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Komplex	Legend	2★
Krakatoa	Abbex	4★
Kung-Fu	Bug-Byte	3★
Laser Zone	Quicksilva	4★
Laserwarp	Mikro-Gen	3★
Lazy Jones	Terminal Software	2★
Les Flics	PSS	3★
Locomotion	Mastertronic	4★
Lode Runner	Software Projects	3★
Loony Zoo	Phipps	3★
Lunar Jetman	Ultimate	5★
Magic Roundabout	CRL	2★
Manic Miner	Bug-Byte	5★
Matrix	Salamander	4★
Maziacs	DK'tronics	4★
Metagalactic Llamas	Salamander	4★
Mighty Magus	Quicksilva	2★
Minder	DK'tronics	4★
Mission Impossible	Silversoft	3★
Mission Omega	Pulsonic	2★
Monkey Biznes	Artic	4★
Moon Cresta	Incentive	3★
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Monty is Innocent	Gremlin Graphics	4★
Mr Wimpey	Ocean	4★
Mummy Mummy	Lothlorien	3★
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Olympimania	Automata	3★
Orion	Software Projects	3★
Paws	Artic	4★
Pedro	Beau Jolly	4★
Penetrator	Melbourne House	5★
Pi-Balled	Automata	4★
Pi-Eyed	Automata	3★
Pitfall II	Activision	3★
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Pssst	Ultimate	4★
Psytron	Beyond	5★
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Pyramid	Fantasy	4★
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Reactor	Gemini	4★
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Rider	Virgin	3★
River Rescue	Creative Sparks	2★
Robot Riot	Silversoft	3★
Rommels Revenge	Crystal	5★
Sabre Wulf	Ultimate	5★
Shadowfire	Beyond	5★
Skooldaze	Microsphere	5★
Scuba Dive	Durrell	5★
Select 1	Computer Records	4★
Skull	Games Machine	3★
Sky Ranger	Microsphere	2★
Snapple Hopper	Macmillan	3★
Software Star	Addictive Games	2★
Sorcery	Virgin	4★
Space Station Zebra	Beyond	3★
Spectron	Virgin	3★
Spellbound	Beyond	4★
Splat	Incentive	4★
Sports Hero	Melbourne House	3★
Spy Hunter	US Gold	4★
Stagecoach	Creative Sparks	4★
Starbike	The Edge	3★
Starion	Melbourne House	4★
Stop the Express	Sinclair	4★
Strangeloop	Virgin	5★
Submarine Strike	Pulsonic	3★
Tachyon Command	Century Software	1★
Tank Trax	Mastertronic	2★
Technician Ted	Hewson	4★
Terrahawks	CRL	3★
The Guardian	PSS	3★

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The Snowman	Quicksilva	4★
Therbo	Arcade Software	2★
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3D Lunattack	Hewson	3★
3D Seiddab Attack	Hewson	3★
3D Starstrike	Realtime software	4★
3D Tank Duel	Real Time	3★
3D Tunnel	New Generation	5★
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Time Gate	Quicksilva	4★
Timebomb	CDS	4★
Tobor	Add-on	4★
Tornado Low Level	Vortex	5★
Toy Bizarre	Activision	3★
Trashman	New Generation	5★
Travel with Trashman	New Generation	4★
Traxx	Quicksilva	4★
Tribble Trubble	Software Projects	4★
Trom	DK'tronics	2★
Turtle Timewarp	Softstone	2★
Tutankhamun	Micromania	4★
Two-Gun Turtle	Lothlorien	4★
Underwurlde	Ultimate	5★
Wheelie	Microsphere	4★
Witch's Cauldron	Mikro-Gen	4★
Wizard's Lair	Bubble Bus	4★
Wizard's Warriors	Mastertronik	2★
World Series Baseball	Imagine	3★
Worm Attack	Pulsonic	1★
Worse Things Happen at Sea	Silversoft	4★
Wrath of Magra	Mastervision	4★
Wriggler	Romantic Robot	4★
Xadom	Quicksilva	2★
Xavior	PSS Software	3★
Zenji	Activision	4★
Zig-Zag	DK'tronics	4★
Zombie Zombie	Quicksilva	4★

Business

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Banker	Andic Software	3★
Bank Account System	K Gouldstone	4★
Bizzicom	Merlin	1★
Cash Controller	Shepherd	4★
Collector's Pack	Sinclair	4★
Database	Microl	4★
Electric Office	Fisher Software	2★
Heathplanner	Heath Computing	4★
Home Budget	Kuma Computers	3★
Investment, Insurance, Information	Inform	3★
Invoicing/Accounting	Transform	4★
Keyfile	Keysoft	4★
Lifeline	William Stuart	2★
Masterfile	Campbell	5★
Micropen	Contrast	3★
Mini Office	Database Pubs	4★
Money Manager	Creative Sparks	3★
Multi-File	ISP	3★
Omnicalc	Microsphere	5★
Personal Banking System	Hilton	4★
Personal Financ.		
Profile 2	McGraw-Hill	3★
Projector 1	McGraw-Hill	4★
Sales Ledger	Hestacrest	4★
Spectext	McGraw Hill	4★
Spreadsheet	Microl	4★
Superfile	Transform Ltd	3★
Tasprint	Tasman Software	4★
Tasword	Tasman	4★
Tasword II	Tasman	5★
The Unitrust Program	Michael Slatford	3★
UNISTAT	University Software	3★
Va£Track	Morley Davies	4★
Word Processor	Quicksilva	1★

Education

Angle	Chalksoft	3★
Angle Turner	Arnold Wheaton	4★
Antony and Cleopatra	Akadamias	4★
Astro Maths	Scisoft	3★
Astronomy	Scisoft	2★
Biology	Longman	4★
Blockbuster	Compusound	4★
Bodyworks	Genesis	2★
Castle	L'Ensouleiado	4★
Castle of Dreams	Widgit	4★
Castle Spellerous	Sinclair	4★

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Chess Tutor 1	Sinclair	4★
Clown	Englefield Software	2★
Cortes	L'Ensouleiado	3★
Dinosaurs	Piper	3★
Disease Dodgers	Sinclair Research	5★
Dyslexia Beater	Dunitz	4★
Eiffel Tower	Chalksoft	3★
Electronic Learner's Guide	ETST	3★
French	Longman	4★
French is Fun	CDS	3★
Friend or Foe	Longman	3★
Viking Raiders	Firebird	3★
German is Fun	CDS	3★
Highway Code	Learning Systems	3★
Highwire	Englefield Software	2★
Hotline	Chalksoft	3★
Humpty Dumpty	Widget	4★
Inkosi	Chalksoft	3★
Learn to Read 1-5	Sinclair	4★
Light and Heat	Rose Software	4★
Linkword	Silversoft	3★
Look Sharp	Mirrorsoft	4★
Macman in the T. Caves	Sinclair Research	3★
Macman's Magic Mirror	Sinclair Research	4★
Mansfield Park	Sussex	4★
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Mathskills II	Griffin	4★
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Mr T Meets His Match	Ebury Software	3★
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Physics	Scisoft	4★
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Postman Pat's Trail Game	Longman	4★
Riddle of the Sphinx	Longman	3★
Run, Rabbit, Run	Longman	4★
Sequences	Chalksoft	3★
Snaffle	Longman	4★
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Speech Marks	Sinclair	4★
Spelling Bee	Image Systems	3★
Startrucker	Widget	4★
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SuperTed	Longman	3★
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Weather Station	Arnold Wheaton	4★
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Language

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Forth	Sinclair	4★
48/80 Forth	ELR	4★
Hisoft C	Hisoft	5★
Logo	Sinclair	5★
Micro Prolog	Sinclair	4★
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Spec. Forth	Abersoft	5★
Spec. Forth	CP	4★
ZX Forth	Artic	4★

Practical

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Astronomer	CP Software	4★
Beamscan	Beamscan	5★
Car Cure	Simtron	1★
Computer Cookbook	Bug Byte	3★
Cricket Averages	Spartan CC	4★
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Diet Master	Diet Master	3★
Dietician	Keysoft	2★
First Aid	Eastmead	2★
How Long have you got?	Eastmead	3★
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Know Your Personality	Mirrorsoft	3★
Love Oracle	Solar Publishing	3★
Microfitness	VO^2	4★
Star Gazer	CRL	4★
The Guide to Medicine	Eastmead	2★
Vega-Table	Vega	4★

Puzzle

Arcturus	Visions	3★
Computaword	Work Force	1★
Flix	Softricks	4★
Hareraiser	Haresoft	2★
Mazecube	PAL	3★
Stuart Henry's Pop Quiz	Bellflower	4★
3D Strategy	Quicksilva	4★

Simulation/Strategy

Airline	CCS	4★
Alien	Mind Games	4★
American Football	Mind Games	4★
Angler	Virgin	3★
Arnhem	CCS	5★
Ashes	Pulsonic	4★
Atram	PD Visual Marketing	3★
Barrington's Squash	New Generation	3★
Battle for Midway	PSS	3★
Battle 1917	CCS	4★
Brewery	CCS	4★
Caribbean Trader	East Midland	4★
Combat Lynx	Durrell	4★
Confrontation	Lothlorien	4★
Confrontation Scenarios	Lothlorien	4★
Conquest	Cheetasoft	3★
Cricket Captain	Allanson	3★
Dix Mille	CCS	3★
Fall of Rome	ASP	3★
Fighter Pilot	Digital Integration	5★
Flight Simulation	Sinclair	4★
Football Manager	Addictive Games	4★
Formula One	CRL	5★
Full Throttle	Micromega	4★
Galaxy Conflict	Martech	4★
Gangsters	CCS	4★
Gatecrasher	Quicksilva	4★
Golf	Virgin	4★
Grand National	Elite	4★
Grand Prix Manager	Silicon Joy	1★
Great Britain Ltd	Hessel	3★
Gyron	Firebird	5★
Heathrow Int ATC	Hewson	4★
Howzat	Wyvern	4★
Hunter Killer	Protek	5★
It's Only Rock 'n' Roll	K-Tel	3★
Match Day	Ocean	3★
Match Point	Sinclair	5★
Millionaire	Incentive	4★
Mugsy	Melbourne House	4★
New Birkdale	Hornby	4★
New Venture	Falcon	2★
1984	Incentive	4★
Oligopoly	CCS	4★
Olympics	CRL	3★
Overlords	Lothlorien	5★
Plunder	CCS	4★
Red Weed	Lothlorien	4★
Regards to Broadway	Argus	3★
Reichswald	MW Gamesworld	2★
Royal Birkdale	Ocean	4★
Scatterbrain	Manor	2★
747 Flight Simulator	DACC	2★
Ski Star 2000	Richard Shepherd	2★
Special Operations	Lothlorien	2★
Spectrealm	Runesoft	3★
Star Trader	Bug Byte	3★
Steve Davis Snooker	CDS	4★
Stonkers	Beau Jolly	5★
Strike Attack	Micromart	2★
Super-League	Cross	3★
Super Soccer	Winters	2★
Test Match	Comp. Rentals	3★
The Biz	Virgin	4★
The Forest	Phipps	4★
Troon	Hornby	4★
United	CCS	2★
Video Pool	OCP	3★
Viking Raiders	Firebird	3★
War 70	CCS	4★
Whodunnit	CCS	4★
Wilfred the Hairy	Microbyte	1★
World Cup Football	Artic	4★

Traditional

Arcturus	Visions	4★
Backgammon	CP Software	4★
Brag	Turtle	4★
Bridge Master	Serin	4★
Bridge Player	CP Software	4★
Bullseye	Mastertronic	2★
Derby Day	CRL	3★
Do Not Pass Go	Work Force	3★
Double Dealer	MFM Software	3★
Draughts	CP Software	4★
Mind Games	Oasis	4★
Pontoon	Contrast	2★
Scrabble	Sinclair	5★
Super Bridge	Buffer Micro	4★
Superchess II	CP Software	4★
Superchess III	CP Software	5★
The Turk	OCP	4★
Voice Chess	Artic	5★
Yatzee	CP Software	3★
ZX Draughts	CP Software	4★
ZX Reversi	CP Software	4★

Utility

Allsort S-1	A Firminger	4★
Assembler	Artic	3★
Assembler	Roybot	2★
Beyond Basic	Sinclair	3★
Building Price	J Redman	3★
Compiler	Softek	3★
Composer	Contrast	1★
FP Compiler	Softek	5★
Games Designer	Quicksilva	4★
HURG	Melbourne House	4★
Keyword Extension	Timedata	4★
Lightmagic	New Generation	4★
Information Handling	McGraw Hill	2★
Make Music	Buffer Micro	4★
Melbourne Draw	Melbourne House	4★
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Music Maker	Bellflower	2★
Paintbox	Print & Plotter	4★
Print Utilities	Sinclair	4★
Quill	Gilsoft	5★
Screen Machine	ISP	4★
Softalk 1-2	CP Software	4★
Spec. Compiler	Softek	4★
Spectre Mac/Mon	Oasis	4★
Spectrosim	Shiva	2★
Spectrum Extended Basic	CP Software	4★
Spectrum Monitor	Picturesque	4★
Spectrum Sprites	ISP	4★
Spectrum Super Toolkit	Nectarine	4★
Supercode II	CP Software	4★
The Comp. M. Code Tutor	New Generation	4★
The Illustrator	Gilsoft	5★
Varitalk	ITS Software	3★
Vu3D	Sinclair	4★
White Lightning	Oasis	5★
Zeus Assembler	Sinclair	5★

QL

Adder Assembler	Adder Publishing	4★
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Assembler Dev. Package	Metacomco	5★
Cartridge Doctor	Talent	5★
EVA	Westway	2★
GraphiQL	Talent	5★
GST Assembler	Sinclair Research	4★
Pascal	Computer One	4★
Pascal	Metacomco	5★
QL Agenda	Q-Soft	1★
QL Cash Trader	Sinclair	5★
QL Caverns	Sinclair	3★
QL Chess	Psion	5★
QL Toolkit	Sinclair	5★
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JUST GOOD FRIENDS: Clive and Bob

Maxwell stepped in to save Slugger's company, generously paying £12m for the privilege of helping to make Britain great again.

The bouncing Czech's knowledge of commuters and programmes is legend. A stunned world listened as Maxwell, speaking on BBC Radio 4, clearly pronounced the word 'software', saying Sinclair's was 'excellent'. He also praised other inventions from 'Sinclair Electronics', including 'the telephone . . . and many other things.'

Slugger himself, a one-time associate of Maxwell's, said he was very pleased. In a recent *Mail on Sunday* article he said: "I have suffered a great deal from ineptitude". Now Cap'n Bob is at the helm, that will change. Any further such articles are unlikely to appear anywhere other than in your own value-for-money Big-3 Bingo *Sunday Mirror*.

OH WHAT A PUNCH-UP!

BRITAIN faces a violent summer, as software houses prepare to do battle with games based on boxing.

Gremlin Graphics enters the ring with **Rocco**, licensed from Spanish comapny Dinamic. Gremlin has changed the name from Rocky after MGM complained. Apparently the graphics make Sylvester Stallone's acting look like the product of a ZX-80.

Meanwhile, the Kindergarten responds with **Frank Bruno's Boxing**, also based on arcade game **Punch Out!** The kids at Eite reckon Big Frank can lay the Spanish challenger cold on the canvas inside three rounds.

The only winner appears to be Silversoft, which thought it had the rights to Rocky until Dinamic revealed the deal with Gremlin Graphics. Silversoft has thus retired from the ring to promote Satanism with its new game **Baal**, a vicarage tea party compared to the fight game scene.



INCORRUPTIBLE: Editor Bill Scolding gazes blankly at a Commode 64 with karate champ Jeoff Thompson. He's waiting for Melbourne House to return his grubby corduroys from the launderette.



ROBSON: Over the top?

Bryan Robson misses game

DOUBTS have been cast over England Captain Bryan Robson's commitment to the game after he failed to turn up for a fixture at Hamleys toyshop in London's Regent Street.

It seems he was double-booked, which sounds like UEFA's latest ploy to combat English Soccer violence.

Bryan was supposed to be launching **Bryan Robson's Super League**, a computer-moderated board game. The game is unique, according to publisher Paul Lamond Ltd, because it uses the computer to 'heighten excitement'.

All other computer board games use the computer to bore people to death.



PEACE THROUGH STRENGTH: Our boys are ready for anything.

MAJOR-GENERAL 'Quickshot II' Goodman practices zapping Russians with Durrell's Combat Lynx. **Watch out Gorbachev — you're next.**

Good luck!

SVELTE, laid-back Rob Cameron, long-suffering advertising manager for *Sinclair User*, is leaving.

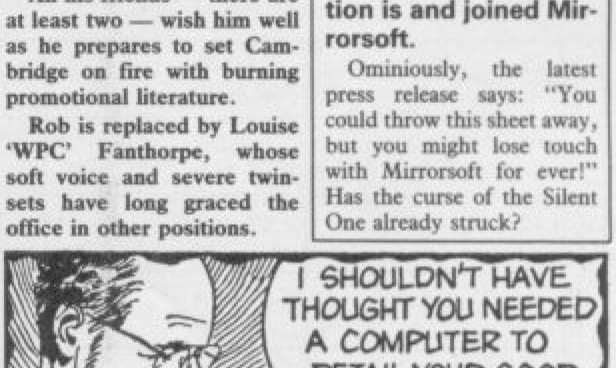
All his friends — there are at least two — wish him well as he prepares to set Cambridge on fire with burning promotional literature.

Rob is replaced by Louise 'WPC' Fanthorpe, whose soft voice and severe twin-sets have long graced the office in other positions.

Hermit

PAUL DUFFY, the peripatetic hermit, ex-GOSH, ex-PRISM has gone to where the action is and joined Mirrorsoft.

Ominiously, the latest press release says: "You could throw this sheet away, but you might lose touch with Mirrorsoft for ever!" Has the curse of the Silent One already struck?



FOREPLAY: Clive ogles Jane.

MIRROR sweetheart Jane learns the Basics from friendly Uncle Clive. During the course of the lesson, she manages to lose all her clothes.



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Written by
Vaughan Dow
Jump Jet Pilot





Every pilot has the dream of flying one of these unique and complex fighting machines. Here is your chance to do what few pilots have the privilege to try.

Depending on your skill, confidence and courage, you have the choice of remaining near the landing pad, learning to hover and land, or venturing higher to practise your approaches.

When you think you have mastered these, then accelerate the Jump Jet into an attack fighter. Use the radar and range finder to seek and destroy the enemy, by launching heat-seeking air-to-air missiles. Beware! His radar and missile systems are as good as yours. Reckless pursuit is ill-advised: you must maintain a fuel level that will enable you to relocate and return to the aircraft carrier, executing the skills you have learned to achieve a successful landing.

You are now ready to proceed to the next skill level to face additional hazards, such as unpredictable swell and treacherous cross-winds.

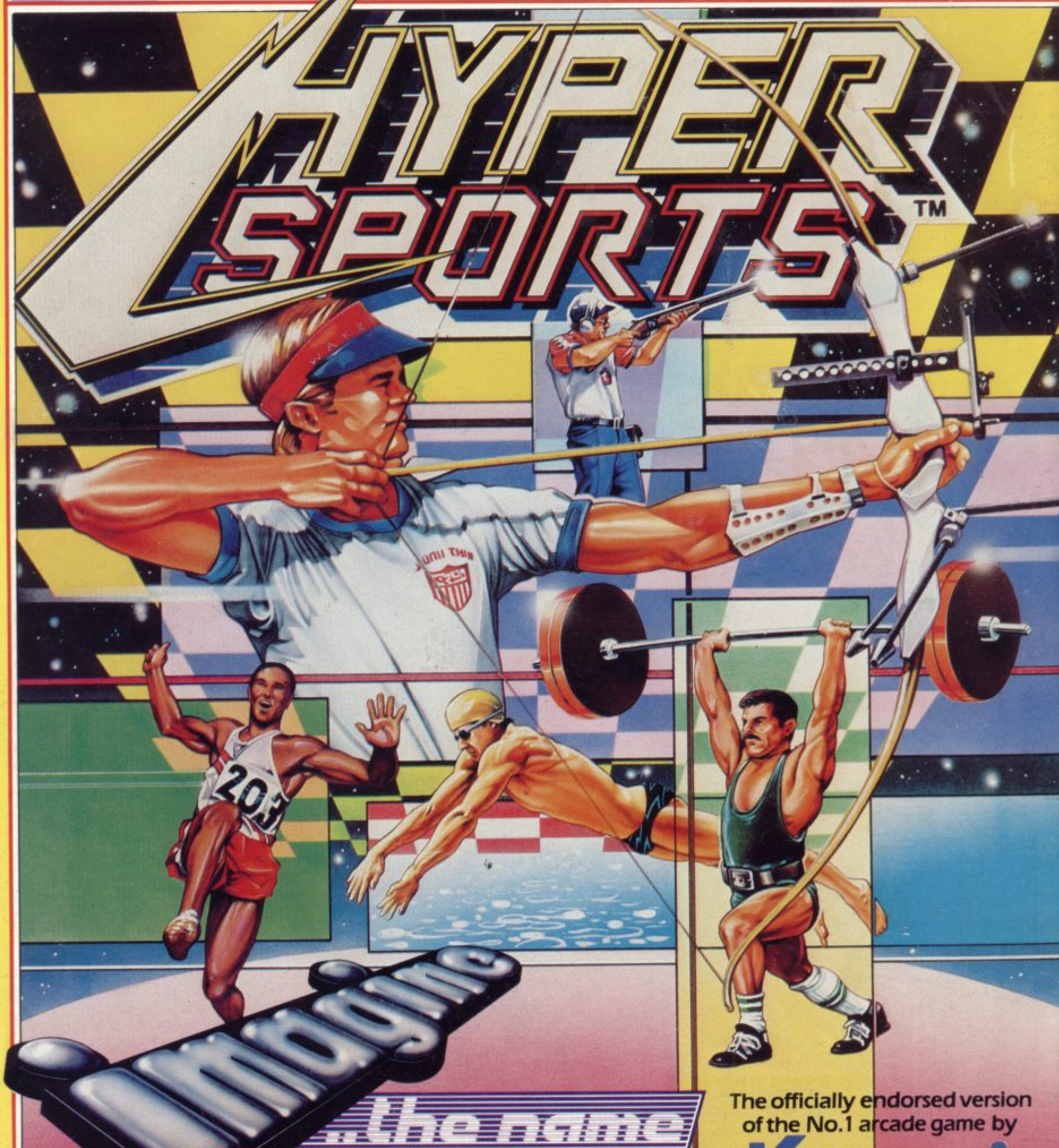
Be warned, this program is not a toy or game. You will need to co-ordinate your hands, eyes and mind to successfully complete each mission. Do not hope to achieve in a short time that which took the author three years to learn as a Jump Jet pilot, and over a year to record on this computer program.

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